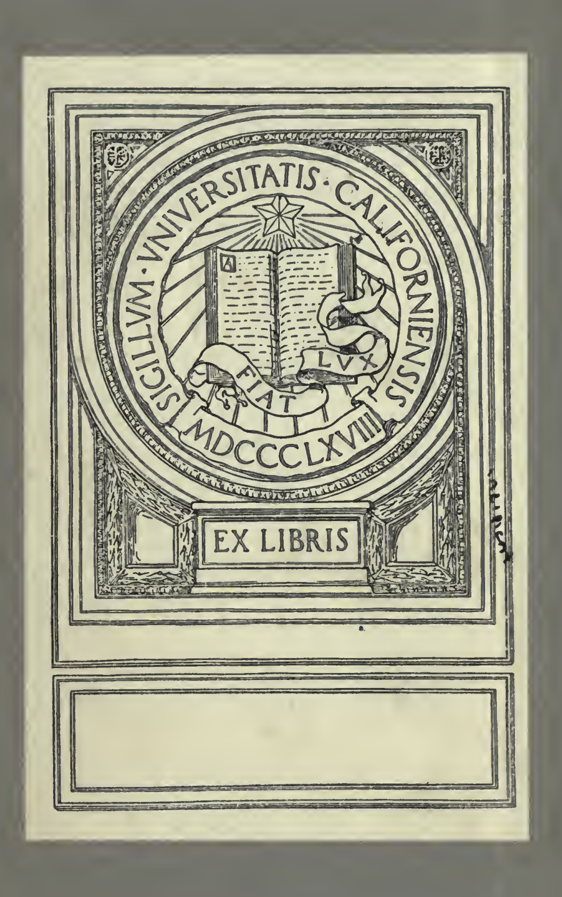


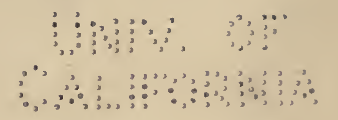

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EARLY GREEK PHILOSOPHY

BY

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Περὶ μὲν τῶν ὄντων τὴν ἀλήθειαν ἐσκόπουν, τὰ δ' ὄντα ὑπέλαβον εἶναι τὰ αἰσθητὰ μόνον.—Aristotle.

SECOND EDITION



LONDON
ADAM AND CHARLES BLACK
1908

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PREFACE TO THE SECOND EDITION

It has been no easy task to revise this volume in such a way as to make it more worthy of the favour with which it has been received. Most of it has had to be rewritten in the light of certain discoveries made since the publication of the first edition, above all, that of the extracts from Menon's Ἰατρικά, which have furnished, as I believe, a clue to the history of Pythagoreanism. I trust that all other obligations are duly acknowledged in the proper place.

It did not seem worth while to eliminate all traces of a certain youthful assurance which marked the first edition. I should not write now as I wrote at the age of twenty-five; but I still feel that the main contentions of the book were sound, so I have not tried to amend the style. The references to Zeller and "Ritter and Preller" are adapted throughout to the latest editions. The Aristotelian commentators are referred to by the pages and verses of the Berlin Academy edition, and Stobaeus by those of Wachsmuth.

J. B.

St. Andrews, 1908.

PREFACE TO THE FIRST EDITION

NO apology is needed for the appearance of a work dealing with Early Greek Philosophy. The want of one has long been felt; for there are few branches of philology in which more progress has been made in the last twenty years, and the results of that progress have not yet been made accessible to the English reader. My original intention was simply to report these results; but I soon found that I was obliged to dissent from some of them, and it seemed best to say so distinctly. Very likely I am wrong in most of these cases, but my mistakes may be of use in calling attention to unobserved points. In any case, I hope no one will think I have been wanting in the respect due to the great authority of Zeller, who was the first to recall the history of philosophy from the extravagances into which it had wandered earlier in the century. I am glad to find that all my divergences from his account have only led me a little further in the path that he struck out.

I am very sensible of the imperfect execution of some parts of this work; but the subject has become so large, and the number of authorities whose testimony must be weighed is so great, that it is not easy for any

one writer to be equally at home in all parts of the field.

I have consulted the student's convenience by giving references to the seventh edition of Ritter and Preller (ed. Schultess) throughout. The references to Zeller are to the fourth German edition, from which the English translation was made. I have been able to make some use also of the recently published fifth edition (1892), and all references to it are distinguished by the symbol Z^5. I can only wish that it had appeared in time for me to incorporate its results more thoroughly.

I have to thank many friends for advice and suggestions, and, above all, Mr. Harold H. Joachim, Fellow of Merton College, who read most of the work before it went to press.

J. B.

OXFORD, 1892.

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ABBREVIATIONS

Arch. — *Archiv für Geschichte der Philosophie.* Berlin, 1888-1908.

Beare. — *Greek Theories of Elementary Cognition*, by John I. Beare. Oxford, 1906.

Diels *Dox.* — *Doxographi graeci.* Hermannus Diels. Berlin, 1879.

Diels *Vors.* — *Die Fragmente der Vorsokratiker*, von Hermann Diels, Zweite Auflage, Erster Band. Berlin, 1906.

Gomperz. — *Greek Thinkers*, by Theodor Gomperz, Authorised (English) Edition, vol. i. London, 1901.

Jacoby. — *Apollodors Chronik*, von Felix Jacoby (*Philol. Unters.* Heft xvi.). Berlin, 1902.

R. P. — *Historia Philosophiae Graecae*, H. Ritter et L. Preller. Editio octava, quam curavit Eduardus Wellmann. Gotha, 1898.

Zeller. — *Die Philosophie der Griechen, dargestellt von Dr. Eduard Zeller.* Erster Theil, Fünfte Auflage. Leipzig, 1892.





EARLY GREEK PHILOSOPHY

INTRODUCTION

I. It was not till the primitive view of the world and the customary rules of life had broken down, that the Greeks began to feel the needs which philosophies of nature and of conduct seek to satisfy. Nor were those needs felt all at once. The traditional maxims of conduct were not seriously questioned till the old view of nature had passed away; and, for this reason, the earliest philosophers busied themselves mainly with speculations about the world around them. In due season, Logic was called into being to meet a fresh want. The pursuit of cosmological inquiry beyond a certain point inevitably brought to light a wide divergence between science and common sense, which was itself a problem that demanded solution, and moreover constrained philosophers to study the means of defending their paradoxes against the prejudices of the unscientific many. Later still, the prevailing interest in logical matters raised the question of the origin and validity of knowledge; while, about the same time, the breakdown of traditional morality gave rise to Ethics. The period which precedes the rise of Logic and Ethics has

The cosmological character of early Greek philosophy.

thus a distinctive character of its own, and may fitly be treated apart.[1]

The primitive view of the world.

II. Even in the earliest times of which we have any record, the primitive view of the world is fast passing away. We are left to gather what manner of thing it was from the stray glimpses we get of it here and there in the older literature, to which it forms a sort of sombre background, and from the many strange myths and stranger rites that lived on, as if to bear witness of it to later times, not only in out-of-the-way parts of Hellas, but even in the "mysteries" of the more cultivated states. So far as we can see, it must have been essentially a thing of shreds and patches, ready to fall in pieces as soon as stirred by the fresh breeze of a larger experience and a more fearless curiosity. The only explanation of the world it could offer was a wild tale of the origin of things. Such a story as that of Ouranos, Gaia, and Kronos belongs plainly, as Mr. Lang has shown in *Custom and Myth*, to the same level of thought as the Maori tale of Papa and Rangi; while in its details the Greek myth is, if anything, the more savage of the two.

We must not allow ourselves to be misled by metaphors about "the childhood of the race," though even these, if properly understood, are suggestive enough. Our ideas of the true state of a child's mind are apt to be coloured by that theory of antenatal existence which has found, perhaps, its highest expression in Wordsworth's

[1] It will be observed that Demokritos falls outside the period thus limited. The common practice of treating this younger contemporary of Sokrates along with the "pre-Socratic philosophers" obscures the true course of historical development. Demokritos comes after Protagoras, and his theory is already conditioned by the epistemological problem. (See Brochard, "Protagoras et Démocrite," *Arch.* ii. p. 368.) He has also a regular theory of conduct (E. Meyer, *Gesch. des Alterth.* iv. § 514 n.).

Ode on the Intimations of Immortality. We transfer these ideas to the race generally, and are thus led to think of the men who made and repeated myths as simple, innocent creatures who were somehow nearer than we are to the beginning of things, and so, perhaps, saw with a clearer vision. A truer view of what a child's thoughts really are will help to put us on the right track. Left to themselves, children are often tormented by vague terrors of surrounding objects which they fear to confide to any one. Their games are based upon an animistic theory of things, and they are great believers in luck and in the lot. They are devotees, too, of that "cult of odds and ends" which is fetishism; and the unsightly old dolls which they often cherish more fondly than the choicest products of the toy-shop, remind us forcibly of the ungainly stocks and stones which Pausanias found in the Holy of Holies of many a stately Greek temple. At Sparta the Tyndaridai were a couple of boards, while the old image of Hera at Samos was a roughly-hewn log.[1]

On the other hand, we must remember that, even in the earliest times of which we have any record, the world was already very old. Those Greeks who first tried to understand nature were not at all in the position of men setting out on a hitherto untrodden path. There was already in the field a tolerably consistent view of the world, though no doubt it was rather implied and assumed in ritual and myth than distinctly realised as such. The early thinkers did a far greater thing than merely to make a beginning. By turning their backs on the savage view of things,

[1] See E. Meyer, *Gesch. des Alterth.* ii. § 64; Menzies, *History of Religion*, pp. 272-276.

they renewed their youth, and with it, as it proved, the youth of the world, at a time when the world seemed in its dotage.

The marvel is that they were able to do this so thoroughly as they did. A savage myth might be preserved here and there to the scandal of philosophers; fetishes, totems, and magic rites might lurk in holes and corners with the moles and with the bats, to be unearthed long afterwards by the curious in such matters. But the all-pervading superstition, which we call primitive because we know not how or whence it came, was gone for ever; and we find Herodotos noting with unfeigned surprise the existence among "barbarians" of beliefs and customs which, not so long ago, his own forefathers had taught and practised quite as zealously as ever did Libyan or Scyth. Even then, he might have found most of them surviving on the "high places" of Hellas.

Traces of the primitive view in early literature.

III. In one respect the way had been prepared already. Long before history begins, the colonisation of the islands and the coasts of Asia Minor had brought about a state of things that was not favourable to the rigid maintenance of traditional customs and ways of thought. A myth is essentially a local thing, and though the emigrants might give the names of ancestral sanctuaries to similar spots in their new homes, they could not transfer with the names the old sentiment of awe. Besides, these were, on the whole, stirring and joyful times. The spirit of adventure is not favourable to superstition, and men whose chief occupation is fighting are not apt to be oppressed by that "fear of the world" which some tell us is the normal state of the savage mind. Even the savage

becomes in great measure free from it when he is really happy.

That is why we find so few traces of the primitive view of the world in Homer. The gods have become frankly human, and everything savage is, so far as may be, kept out of sight. There are, of course, vestiges of early beliefs and practices, but they are exceptional. In that strange episode of the Fourteenth Book of the *Iliad* known as *The Deceiving of Zeus* we find a number of theogonical ideas which are otherwise quite foreign to Homer, but they are treated with so little seriousness that the whole thing has even been regarded as a parody or burlesque of some primitive poem on the birth of the gods. That, however, is to mistake the spirit of Homer. He finds the old myth ready to his hand, and sees in it matter for a "joyous tale," just as Demodokos did in the loves of Ares and Aphrodite. There is no antagonism to traditional views, but rather a complete detachment from them. 1. Homer.

It has often been noted that Homer never speaks of the primitive custom of purification for bloodshed. The dead heroes are burned, not buried, as the kings of continental Hellas were. Ghosts play hardly any part. In the *Iliad* we have, to be sure, the ghost of Patroklos, in close connexion with the solitary instance of human sacrifice in Homer. All that was part of the traditional story, and Homer says as little about it as he can. There is also the *Nekyia* in the Eleventh Book of the *Odyssey*, which has been assigned to a late date on the ground that it contains Orphic ideas. The reasoning does not appear cogent. As we shall see, the Orphics did not so much invent new ideas as revive old ones, and if the legend took Odysseus to the abode of the

dead, that had to be described in accordance with the accepted views about it.

In fact, we are never entitled to infer from Homer's silence that the primitive view was unknown to him. The absence of certain things from the poems is due to reticence rather than ignorance; for, wherever anything to his purpose was to be got from an old story, he did not hesitate to use it. On the other hand, when the tradition necessarily brought him into contact with savage ideas, he prefers to treat them with reserve. We may infer, then, that at least in a certain society, that of the princes for whom Homer sang, the primitive view of the world was already discredited by a comparatively early date.[1]

2. Hesiod. IV. When we come to Hesiod, we seem to be in another world. We hear stories of the gods which are not only irrational but repulsive, and these stories are told quite seriously. Hesiod makes the Muses say: "We know how to tell many false things that are like the truth; but we know too, when we will, to utter what is true."[2] This means that he was quite conscious of the difference between the Homeric spirit and his own. The old light-heartedness is gone, and it is important to tell the truth about the gods. Hesiod knows, too, that he belongs to a later and a sadder time than Homer. In describing the Ages of the World, he inserts a fifth age between those of Bronze and Iron. That is the Age of the Heroes, the age Homer sang of. It was better than the Bronze Age which came before it,

[1] On all this, see especially Rohde, *Psyche*, pp. 14 sqq.

[2] Hes. *Theog.* 27. They are the same Muses who inspired Homer, which means, in our language, that Hesiod wrote in hexameters and used the Epic dialect. The new literary *genre* has not yet found its appropriate vehicle, which is elegy.

and far better than that which followed it, the Age of Iron, in which Hesiod lives.[1] He also feels that he is singing for another class. It is to shepherds and husbandmen he addresses himself, and the princes for whom Homer sang have become remote persons who give "crooked dooms." For common men there is no hope but in hard, unceasing toil. It is the voice of the people we now hear for the first time, and of a people for whom the romance and splendour of the Greek Middle Ages meant nothing. The primitive view of the world had never really died out among them; so it was natural for their first spokesman to assume it in his poems. That is why we find in Hesiod these old, savage tales, which Homer disdained to speak of.

Yet it would be wrong to see in the *Theogony* a mere revival of the old superstition. Nothing can ever be revived just as it was; for in every reaction there is a polemical element which differentiates it completely from the earlier stage it vainly seeks to reproduce. Hesiod could not help being affected by the new spirit which trade and adventure had awakened over the sea, and he became a pioneer in spite of himself. The rudiments of what grew into Ionic science and history are to be found in his poems, and he really did more than any one to hasten that decay of the old ideas which he was seeking to arrest. The *Theogony* is an attempt to reduce all the stories about the gods into a single system, and system is necessarily fatal to so wayward a thing as mythology. Hesiod, no less than Homer, teaches a panhellenic polytheism; the only difference

[1] There is great historical insight here. It was Hesiod, not our modern historians, who first pointed out that the "Greek Middle Ages" were a break in the normal development.

is that with him this is more directly based on the legends attached to the local cults, which he thus sought to invest with a national significance. The result is that the myth becomes primary and the cult secondary, a complete inversion of the primitive relation. Herodotos tells us that it was Homer and Hesiod who made a theogony for the Hellenes, who gave the gods their names, and distributed among them their offices and arts,[1] and it is perfectly true. The Olympian pantheon took the place of the old local gods in men's minds, and this was as much the doing of Hesiod as of Homer. The ordinary man had no ties to this company of gods, but at most to one or two of them; and even these he would hardly recognise in the humanised figures, detached from all local associations, which poetry had substituted for the older objects of worship. The gods of Greece had become a splendid subject for art; but they came between the Hellenes and their ancestral religions. They were incapable of satisfying the needs of the people, and that is the secret of the religious revival which we shall have to consider in the sequel.

Cosmogony.

V. Nor is it only in this way that Hesiod shows himself a child of his time. His *Theogony* is at the same time a Cosmogony, though it would seem that here he was following others rather than working out a thought of his own. At any rate, he only mentions the two great cosmogonical figures, Chaos and Eros, and does not really bring them into connexion with his system. The conception of Chaos represents a distinct effort to picture the beginning of things. It is not a formless mixture, but rather, as its etymology indicates, the yawning gulf or gap where nothing is as

[1] Herod. ii. 53.

yet.[1] We may be sure that this is not primitive. Savage man does not feel called upon to form an idea of the very beginning of all things; he takes for granted that there was something to begin with. The other figure, that of Eros, was doubtless intended to explain the impulse to production which gave rise to the whole process. That, at least, is what the Maoris mean by it, as may be seen from the following remarkable passage[2] :—

> From the conception the increase,
> From the increase the swelling,
> From the swelling the thought,
> From the thought the remembrance,
> From the remembrance the desire.
> The word became fruitful,
> It dwelt with the feeble glimmering,
> It brought forth the night.

Hesiod must have had some such primitive speculation to work on, but he does not tell us anything clearly on the subject.

We have records of great activity in the production of cosmogonies during the whole of the sixth century B.C., and we know something of the systems of Epimenides, Pherekydes,[3] and Akousilaos. As there were speculations of this kind even before Hesiod, we need have no hesitation in believing that the earliest Orphic cosmogony goes back to that century too.[4]

[1] The word χάος certainly means the "gape" or "yawn," the Orphic χάσμα πελώριον. Grimm compared it with the Scandinavian *Ginnunga-Gap*.

[2] Quoted from Taylor's *New Zealand*, pp. 110-112, by Mr. Andrew Lang, in *Myth, Ritual, and Religion*, vol. ii. p. 52 (2nd ed.).

[3] For the remains of Pherekydes, see Diels, *Vorsokratiker*, pp. 506 sqq. (1st ed.), and the interesting account in Gomperz, *Greek Thinkers*, vol. i. pp. 85 sqq.

[4] This was the view of Lobeck with regard to the so-called "Rhapsodic Theogony" described by Damaskios, and was revived by Otto Kern (*De Orphei Epimenidis Pherecydis Theogoniis*, 1888). Its savage character is the best proof of its antiquity. Cf. Lang, *Myth, Ritual, and Religion*, vol. i. chap. x.

The feature which is common to all these systems is the attempt to get behind the gap, and to put Kronos or Zeus in the first place. This is what Aristotle has in view when he distinguishes the "theologians" from those who were half theologians and half philosophers, and who put what was best in the beginning.[1] It is obvious, however, that this process is the very reverse of scientific, and might be carried on indefinitely; so we have nothing to do with the cosmogonists in our present inquiry, except so far as they can be shown to have influenced the course of more sober investigations. Indeed, these speculations are still based on the primitive view of the world, and so fall outside the limits we have traced for ourselves.

General characteristics of early Greek cosmology.

VI. What, then, was the step that placed the Ionian cosmologists once for all above the level of the Maoris? Grote and Zeller make it consist in the substitution of impersonal causes acting according to law for personal causes acting arbitrarily. But the distinction between personal and impersonal was not really felt in antiquity, and it is a mistake to lay much stress on it. It seems rather that the real advance made by the scientific men of Miletos was that they left off telling tales. They gave up the hopeless task of describing what was when as yet there was nothing, and asked instead what all things really are now.

Ex nihilo nihil.

The great principle which underlies all their thinking, though it is first put into words by Parmenides, is that *Nothing comes into being out of nothing, and nothing passes away into nothing.* They saw, however, that particular things were always

[1] Arist. *Met.* N, 4. 1091 b 8.

coming into being and passing away again, and from this it followed that their existence was no true or stable one. The only things that were real and eternal were the original matter which passed through all these changes and the motion which gave rise to them, to which was soon added that law of proportion or compensation which, despite the continual becoming and passing away of things, secured the relative permanence and stability of the various forms of existence that go to make up the world. That these were, in fact, the leading ideas of the early cosmologists, cannot, of course, be proved till we have given a detailed exposition of their systems; but we can show at once how natural it was for such thoughts to come to them. It is always the problem of change and decay that first excites the wonder which, as Plato says, is the starting-point of all philosophy. Besides this, there was in the Ionic nature a vein of melancholy which led it to brood upon the instability of things. Even before the time of Thales, Mimnermos of Kolophon sings the sadness of change; and, at a later date, the lament of Simonides, that the generations of men fall like the leaves of the forest, touches a chord already struck by the earliest singer of Ionia.[1] Now, so long as men could believe everything they saw was alive like themselves, the spectacle of the unceasing death and new birth of nature would only tinge their thoughts with a certain mournfulness, which would find its expression in such things as the Linos dirges which the Greeks borrowed from their Asiatic neighbours;[2] but when

[1] Simonides, fr. 85, 2 Bergk. *Il.* vi. 146.

[2] On Adonis-Thammuz, Lityerses, Linos, and Osiris, see Frazer, *Golden Bough*, vol. i. pp. 278 sqq.

primitive animism, which had seen conscious life everywhere, was gone, and polytheistic mythology, which had personified at least the more striking natural phenomena, was going, it must have seemed that there was nowhere any abiding reality. Nowadays we are accustomed, for good and for ill, to the notion of dead things, obedient, not to inner impulses, but solely to mechanical laws. But that is not the view of the natural man, and we may be sure that, when first it forced itself on him, it must have provoked a strong sense of dissatisfaction. Relief was only to be had from the reflexion that as nothing comes from nothing, nothing can pass away into nothing. There must, then, be something which always is, something fundamental which persists throughout all change, and ceases to exist in one form only that it may reappear in another. It is significant that this something is spoken of as "deathless" and "ageless."[1]

Φύσις. VII. So far as I know, no historian of Greek philosophy has clearly laid it down that the word which was used by the early cosmologists to express this idea of a permanent and primary substance was none other than φύσις; and that the title Περὶ φύσεως, so commonly given to philosophical works of the sixth and fifth centuries B.C.,[2] means simply *Concerning the Primary Substance.* Both Plato and Aristotle use the term in this sense when they are

[1] The Epic phrase ἀθάνατος καὶ ἀγήρως seems to have suggested this. Anaximander applied both epithets to the primary substance (R. P. 17 and 17 a). Euripides, in describing the blessedness of the scientific life (fr. inc. 910), says ἀθανάτου . . . φύσεως κόσμον ἀγήρω (R. P. 148 c fin.).

[2] I do not mean to imply that the philosophers used this title themselves; for early prose writings had no titles. The writer mentioned his name and the subject of his work in the first sentence, as Herodotos, for instance, does.

discussing the earlier philosophy,[1] and its history shows clearly enough what its original meaning must have been. In Greek philosophical language, φύσις always means that which is primary, fundamental, and persistent, as opposed to what is secondary, derivative, and transient; what is "given," as opposed to that which is made or becomes. It is what is there to begin with. It is true that Plato and his successors also identify φύσις with the best or most normal condition of a thing; but that is just because they held the goal of any development to be prior to the process by which it is reached. Such an idea was wholly unknown to the pioneers of philosophy. They sought the explanation of the incomplete world we know, not in the end, but in the beginning. It seemed to them that, if only they could strip off all the modifications which Art and Chance had introduced, they would get at the ultimately real; and so the search after φύσις, first in the world at large and afterwards in human society, became the chief interest of the age we have to deal with.

The word ἀρχή, by which the early cosmologists are usually said to have designated the object of their search, is in this sense purely Aristotelian. It is quite natural that it should be employed in the well-known historical sketch of the First Book of the *Metaphysics*; for Aristotle is there testing the theories of earlier thinkers by his own doctrine of the four causes. But Plato never uses the term in this connexion, and it does not occur once in the genuine fragments of the

[1] Plato, *Laws*, 892 c 2, *φύσιν βούλονται λέγειν γένεσιν (i.e. τὸ ἐξ οὗ γίγνεται) τὴν περὶ τὰ πρῶτα (i.e. τὴν τῶν πρώτων).* Arist. *Phys.* B, 1. 193 a 21, *διόπερ οἱ μὲν πῦρ, οἱ δὲ γῆν, οἱ δ' ἀέρα φασίν, οἱ δὲ ὕδωρ, οἱ δ' ἔνια τούτων, οἱ δὲ πάντα ταῦτα τὴν φύσιν εἶναι τὴν τῶν ὄντων.*

early philosophers. It is confined to the Stoic and Peripatetic handbooks from which most of our knowledge is derived, and these simply repeat Aristotle. Zeller has pointed out in a footnote[1] that it would be an anachronism to refer the subtle Aristotelian use of the word to the beginnings of speculation. To Anaximander ἀρχή could only have meant "beginning," and it was far more than a beginning that the early cosmologists were looking for: it was the *eternal* ground of all things.

There is one very important conclusion that follows at once from the account just given of the meaning of φύσις, and it is, that the search for the primary substance really was the thing that interested the Ionian philosophers. Had their main object been, as Teichmüller held it was, the explanation of celestial and meteorological phenomena, their researches would not have been called Περὶ φύσεως ἱστορίη,[2] but rather Περὶ οὐρανοῦ or Περὶ μετεώρων. And this we shall find confirmed by a study of the way in which Greek cosmology developed. The growing thought which may be traced through the successive representatives of any school is always that which concerns the primary substance, while the astronomical and other theories are, in the main, peculiar to the individual thinkers. Teichmüller undoubtedly did good service by his protest against the treatment of these theories as mere isolated curiosities. They form, on the con-

[1] Zeller, p. 217, n. 2 (Eng. trans. p. 248, n. 2). See below, Chap. I. p. 57, n. 1.

[2] We have the authority of Plato for giving them this name. Cf. *Phd.* 96 a 7, ταύτης τῆς σοφίας ἣν δὴ καλοῦσι περὶ φύσεως ἱστορίαν. So, in the fragment of Euripides referred to on p. 12, n. 1, the man who discerns "the ageless order of immortal φύσις" is referred to as ὅστις τῆς ἱστορίας ἔσχε μάθησιν.

trary, coherent systems which must be looked at as wholes. But it is none the less true that Greek philosophy began, as it ended, with the search for what was abiding in the flux of things.

Motion and rest.

VIII. But how could this give back to nature the life of which it had been robbed by advancing knowledge? Simply by making it possible for the life that had hitherto been supposed to reside in each particular thing to be transferred to the one thing of which all others were passing forms. The very process of birth, growth, and decay might now be regarded as the unceasing activity of the one ultimate reality. Aristotle and his followers expressed this by saying that the early cosmologists believed in an "eternal motion," and in substance this is correct, though it is not probable that they said anything about the eternal motion in their writings. It is more likely that they simply took it for granted. In early times, it is not movement but rest that has to be accounted for, and we may be sure that the eternity of motion was not asserted till it had been denied. As we shall see, it was Parmenides who first denied it. The idea of a single ultimate substance, when thoroughly worked out, seemed to leave no room for motion; and after the time of Parmenides, we do find that philosophers were concerned to show how it began. At first, this would not seem to require explanation at all.

Modern writers sometimes give the name of Hylozoism to this way of thinking, but the term is apt to be misleading. It suggests theories which deny the separate reality of life and spirit, whereas, in the days of Thales, and even far later, the distinction

between matter and spirit had not been felt, still less formulated in such a way that it could be denied. The uncreated, indestructible reality of which these early thinkers tell us was a body, or even matter, if we choose to call it so; but it was not matter in the sense in which matter is opposed to spirit.

The downfall of the primitive view of the world.

IX. We have indicated the main characteristics of the primitive view of the world, and we have sketched in outline the view which displaced it; we must now consider the causes which led to the downfall of the one and the rise of the other. Foremost among these was undoubtedly the widening of the Greek horizon occasioned by the great extension of maritime enterprise which followed the decay of the Phoenician naval supremacy. The scene of the old stories had, as a rule, been laid just outside the boundaries of the world known to the men who believed them. Odysseus does not meet with Kirke or the Kyklops or the Sirens in the familiar Aegean, but in regions which lay beyond the ken of the Greeks at the time the *Odyssey* was composed. Now, however, the West was beginning to be familiar too, and the fancy of the Greek explorers led them to identify the lands which they discovered with the places which the hero of the national fairy-tale had come to in his wanderings. It was soon discovered that the monstrous beings in question were no longer to be found there, and the belief grew up that they had never been there at all. So, too, the Milesians had settled colonies all round the Euxine. The colonists went out with Ἀργὼ πᾶσι μέλουσα in their minds; and, at the same time as they changed the name of the Inhospitable to the Hospitable Sea, they localised the "far country" (*αἶα*) of the

primitive tale, and made Jason fetch the Golden Fleece from Kolchis. Above all, the Phokaians had explored the Mediterranean as far as the Pillars of Herakles,[1] and the new knowledge that the "endless paths" of the sea had boundaries must have moved men's minds in much the same way as the discovery of America did in later days. A single example will illustrate the process which was always going on. According to the primitive view, the heavens were supported by a giant called Atlas. No one had ever seen him, though he was supposed to live in Arkadia. The Phokaian explorers identified him with a cloud-capped mountain in Africa, and once they had done this, the old belief was doomed. It was impossible to go on believing in a god who was also a mountain, conveniently situated for the trader to steer by, as he sailed to Tarshish in quest of silver.

X. But by far the most important question we have to face is that of the nature and extent of the influence exercised by what we call Eastern wisdom on the Greek mind. It is a common idea even now that the Greeks in some way derived their philosophy from Egypt and Babylon, and we must therefore try to understand as clearly as possible what such a statement really means. To begin with, we must observe that no writer of the period during which Greek philosophy flourished knows anything at all of its having come from the East. Herodotos would not have omitted to say so, had he ever heard of it; for it would have confirmed his own belief in the Egyptian origin of Greek religion and civilisation.[2] Plato, who

Alleged Oriental origin of philosophy.

[1] Herod. i. 163.

[2] All he can say is that the worship of Dionysos and the doctrine of transmigration came from Egypt (ii. 49, 123). We shall see that both these

had a very great respect for the Egyptians on other grounds, distinctly implies that they were a business-like rather than a philosophical people.[1] Aristotle speaks only of the origin of mathematics in Egypt[2] (a point to which we shall return), though, if he had known of an Egyptian philosophy, it would have suited his argument better to mention that. It is not till a far later date, when Egyptian priests and Alexandrian Jews began to vie with one another in discovering the sources of Greek philosophy in their own past, that we first have definite statements to the effect that it came from Phoenicia or Egypt. Here, however, we must carefully note two things. In the first place, the word "philosophy" had come by that time to include theology of a more or less mystical type, and was even applied to various forms of asceticism.[3] In the second place, the so-called Egyptian philosophy was only arrived at by a process of turning primitive myths into allegories. We are still able to judge Philo's Old Testament interpretation for ourselves, and we may be sure that the Egyptian allegorists were even more arbitrary; for they had far less promising material to work on. Nothing can be more savage than the myth of Isis and Osiris;[4] yet it is first interpreted accord-

statements are incorrect, and in any case they do not imply anything directly as to philosophy.

[1] In *Rep.* 435 e, after saying that τὸ θυμοειδές is characteristic of the Thracians and Scythians, and τὸ φιλομαθές of the Hellenes, he refers us to Phoenicia and Egypt for τὸ φιλοχρήματον. In the *Laws*, where the Egyptians are so strongly commended for their conservatism in matters of art, he says (747 b 6) that arithmetical studies are valuable only if we remove all ἀνελευθερία and φιλοχρηματία from the souls of the learners. Otherwise, we produce πανουργία instead of σοφία, as we can see that the Phoenicians, the Egyptians, and many other peoples do.

[2] Arist. *Met.* A, 1. 981 b 23.

[3] See Zeller, p. 3, n. 2. Philo applies the term πάτριος φιλοσοφία to the theology of the Essenes and Therapeutai.

[4] On this, see Lang, *Myth, Ritual, and Religion*, vol. ii. p. 135.

ing to the ideas of later Greek philosophy, and then declared to be the original source of that philosophy.

This method of interpretation may be said to culminate with the Neopythagorean Noumenios, from whom it passed to the Christian Apologists. It is Noumenios who asks, "What is Plato, but Moses speaking Attic?"[1] It seems likely, indeed, that he was thinking of certain marked resemblances between Plato's *Laws* and the Levitical Code when he said this—resemblances due to the fact that certain primitive legal ideas are similarly modified in both; but in any case Clement and Eusebios give the remark a far wider application.[2] At the Renaissance, this absurd farrago was revived along with everything else, and certain ideas derived from the *Praeparatio Evangelica* continued for long to colour accepted views on the subject. Even Cudworth speaks complacently of the ancient "Moschical or Mosaical philosophy" taught by Thales and Pythagoras.[3] It is important to realise the true origin of this deeply-rooted prejudice against the originality of the Greeks. It does not come from modern researches into the beliefs of ancient peoples; for these have disclosed absolutely nothing in the way of evidence for a Phoenician or Egyptian philosophy. It is a mere residuum of the Alexandrian passion for allegory.

[1] Noumenios, fr. 13 (R. P. 624), Τί γάρ ἐστι Πλάτων ἢ Μωυσῆς ἀττικίζων;

[2] Clement (*Strom.* i. p. 8, 5, Stählin) calls Plato ὁ ἐξ Ἑβραίων φιλόσοφος.

[3] We learn from Strabo (xvi. p. 757) that it was Poseidonios who introduced Mochos of Sidon into the history of philosophy. He attributes the atomic theory to him. His identification with Moses, however, is a later *tour de force*. Philon of Byblos published what purported to be a translation of an ancient Phoenician history by Sanchuniathon, which was used by Porphyry and afterwards by Eusebios. How familiar all this became, is shown by the speech of the stranger in the *Vicar of Wakefield*, chap. xiv.

Of course no one nowadays would rest the case for the Oriental origin of Greek philosophy on the evidence of Clement or Eusebios; the favourite argument in recent times has been the analogy of the arts and religion. We are seeing more and more, it is said, that the Greeks derived their art and many of their religious ideas from the East; and it is urged that the same will in all probability prove true of their philosophy. This is a specious argument, but not in the least conclusive. It ignores altogether the essential difference in the way these things are transmitted from people to people. Material civilisation and the arts may pass easily from one people to another, though they have not a common language, and certain simple religious ideas can be conveyed by ritual better than in any other way. Philosophy, on the other hand, can only be expressed in abstract language, and it can only be transmitted by educated men, whether by means of books or oral teaching. Now we know of no Greek, in the times we are dealing with, who knew enough of any Oriental language to read an Egyptian book or even to listen to the discourse of an Egyptian priest, and we never hear till a late date of Oriental teachers who wrote or spoke in Greek. The Greek traveller in Egypt would no doubt pick up a few words of Egyptian, and it is certain that somehow or other the priests could make themselves understood by the Greeks. They were able to rebuke Hekataios for his family pride, and Plato tells a story of the same sort at the beginning of the *Timaeus*.[1] But they must have made use of interpreters, and it is impossible to conceive of

[1] Herod. ii. 143; Plato, *Tim.* 22 b 3.

philosophical ideas being communicated through an uneducated dragoman.[1]

But really it is not worth while to ask whether the communication of philosophical ideas was possible or not, till some evidence has been produced that any of these peoples had a philosophy to communicate. No such evidence has yet been discovered, and, so far as we know, the Indians were the only people besides the Greeks who ever had anything that deserves the name. No one now will suggest that Greek philosophy came from India, and indeed everything points to the conclusion that Indian philosophy came from Greece. The chronology of Sanskrit literature is an extremely difficult subject; but, so far as we can see, the great Indian systems are later in date than the Greek philosophies which they most nearly resemble. Of course the mysticism of the Upanishads and of Buddhism were of native growth and profoundly influenced philosophy, but they were not themselves philosophy in any true sense of the word.[2]

Egyptian mathematics.

XI. It would, however, be another thing to say that Greek philosophy originated quite independently of Oriental influences. The Greeks themselves believed

[1] Gomperz's "native bride," who discusses the wisdom of her people with her Greek lord (*Greek Thinkers*, vol. i. p. 95), does not convince me either. She would probably teach her maids the rites of strange goddesses; but she would not be likely to talk theology with her husband, and still less philosophy or science. The use of Babylonian as an international language will account for the fact that the Egyptians knew something of Babylonian astronomy; but it does not help us to explain how the Greeks could communicate with the Egyptians. It is plain that the Greeks did not even know of this international language; for it is just the sort of thing they would have recorded with interest if they had. In early days, they may have met with it in Cyprus, but that was apparently forgotten.

[2] For the possibility that Indian philosophy came from Greece, see Weber, *Die Griechen in Indien* (Berl. Sitzb. 1890, pp. 901 sqq.), and Goblet d'Alviella, *Ce que l'Inde doit à la Grèce* (Paris, 1897).

their mathematical science to be of Egyptian origin, and they must also have known something of Babylonian astronomy. It cannot be an accident that philosophy originated in Ionia just at the time when communication with these two countries was easiest, and it is significant that the very man who was said to have introduced geometry from Egypt is also regarded as the first of the philosophers. It thus becomes very important for us to discover, if we can, what Egyptian mathematics meant. We shall see that, even here, the Greeks were really original.

There is a papyrus in the Rhind collection at the British Museum[1] which gives us an instructive glimpse of arithmetic and geometry as these sciences were understood on the banks of the Nile. It is the work of one Aahmes, and contains rules for calculations both of an arithmetical and a geometrical character. The arithmetical problems mostly concern measures of corn and fruit, and deal particularly with such questions as the division of a number of measures among a given number of persons, the number of loaves or jars of beer that certain measures will yield, and the wages due to the workmen for a certain piece of work. It corresponds exactly, in fact, to the description of Egyptian arithmetic which Plato has given us in the *Laws*, where he tells us that the children learnt along with their letters to solve problems in the distribution of apples and wreaths to greater or smaller numbers of

[1] I am indebted for most of the information which follows to Cantor's *Vorlesungen über Geschichte der Mathematik*, vol. i. pp. 46-63. See also Gow's *Short History of Greek Mathematics*, §§ 73-80; and Milhaud, *La science grecque*, pp. 91 sqq. The discussion in the last-named work is of special value because it is based on M. Rodet's paper in the *Bulletin de la Société Mathématique*, vol. vi., which in some important respects supplements the interpretation of Eisenlohr, on which the earlier accounts depend.

people, the pairing of boxers and wrestlers, and so forth.[1] This is clearly the origin of the art which the Greeks called *λογιστική*, and they certainly borrowed that from Egypt; but there is not the slightest trace of what the Greeks called *ἀριθμητική*, or the scientific study of numbers.

The geometry of the Rhind papyrus is of a similarly utilitarian character, and Herodotos, who tells us that Egyptian geometry arose from the necessity of measuring the land afresh after the inundations, is obviously far nearer the mark than Aristotle, who says that it grew out of the leisure enjoyed by the priestly caste.[2] We find, accordingly, that the rules given for calculating areas are only exact when these are rectangular. As fields are usually more or less rectangular, this would be sufficient for practical purposes. The rule for finding what is called the *seqt* of a pyramid is, however, on a rather higher level, as we should expect; for the angles of the Egyptian pyramids really are equal, and there must have been some method for obtaining this result. It comes to this. Given the "length across the sole of the foot," that is, the diagonal of the base, and that of the *piremus* or "ridge," to find a number which represents the ratio between them. This is done by dividing half the diagonal of the base by the "ridge," and it is obvious that such a method might quite well be discovered empirically. It seems an anachronism to speak of elementary trigonometry in connexion with

[1] Plato, *Laws*, 819 b 4, *μήλων τέ τινων διανομαὶ καὶ στεφάνων πλείοσιν ἅμα καὶ ἐλάττοσιν ἁρμοττόντων ἀριθμῶν τῶν αὐτῶν, καὶ πυκτῶν καὶ παλαιστῶν ἐφεδρείας τε καὶ συλλήξεως ἐν μέρει καὶ ἐφεξῆς καὶ ὡς πεφύκασι γίγνεσθαι. καὶ δὴ καὶ παίζοντες, φιάλας ἅμα χρυσοῦ καὶ χαλκοῦ καὶ ἀργύρου καὶ τοιούτων τινῶν ἄλλων κεραννύντες, οἱ δὲ καὶ ὅλας πως διαδιδόντες.* In its context, the passage implies that no more than this could be learnt in Egypt.

[2] Herod. ii. 109; Arist. *Met.* A, 1. 981 b 23.

a rule like this, and there is nothing to suggest that the Egyptians went any further.[1] That the Greeks learnt as much from them, we shall see to be highly probable, though we shall see also that, from a comparatively early period, they generalised it so as to make it of use in measuring the distances of inaccessible objects, such as ships at sea. It was probably this generalisation that suggested the idea of a science of geometry, which was really the creation of the Pythagoreans, and we can see how far the Greeks soon surpassed their teachers from a remark of Demokritos which has been preserved. He says (fr. 299): "I have listened to many learned men, but no one has yet surpassed me in the construction of figures out of lines accompanied by demonstration, not even the Egyptian *harpedonapts*, as they call them."[2] Now the word ἁρπεδονάπτης is not Egyptian but Greek. It means "cord-fastener,"[3] and it is a striking coincidence that the oldest Indian geometrical treatise is called the *Çulvasutras* or "rules of the cord." These things point to the use of the triangle of which the sides are 3, 4, 5, and which has always a right angle. We know that this triangle was used from an early date among the Chinese and the Hindus, who doubtless got it from Babylon, and we shall see that Thales probably learnt the use of it in Egypt.[4] There is no reason whatever for supposing that any of these peoples had in any degree troubled themselves to give a theoretical

[1] For a fuller account of this method, see Gow, *Short History of Greek Mathematics*, pp. 127 sqq.; and Milhaud, *Science grecque*, p. 99.

[2] R. P. 188.

[3] The real meaning of ἁρπεδονάπτης was first pointed out by Cantor. The gardener laying out a flower-bed is the true modern representative of the "harpedonapts."

[4] See Milhaud, *Science grecque*, p. 103.

demonstration of its properties, though Demokritos would certainly have been able to do so. Finally, we must note the highly significant fact that all mathematical terms are of purely Greek origin.[1]

XII. The other source from which the Ionians directly or indirectly derived material for their cosmology was the Babylonian astronomy. There is no doubt that the Babylonians from a very early date had recorded all celestial phenomena like eclipses. They had also studied the planetary motions, and determined the signs of the zodiac. Further, they were able to predict the recurrence of the phenomena they had observed with considerable accuracy by means of cycles based on their recorded observations. I can see no reason for doubting that they had observed the phenomenon of precession. Indeed, they could hardly have failed to notice it; for their observations went back over so many centuries, that it would be quite appreciable. We know that, at a later date, Ptolemy estimated the precession of the equinoxes at one degree in a hundred years, and it is extremely probable that this is just the Babylonian value. At any rate, it agrees very well with their division of the celestial circle into 360 degrees, and made it possible for a century to be regarded as a day in the "Great Year," a conception we shall meet with later on.[2]

Babylonian astronomy.

[1] The word πυραμίς is often supposed to be derived from the term *piremus* used in the Rhind papyrus, which does not mean pyramid, but "ridge." It is really, however, a Greek word too, and is the name of a kind of cake. The Greeks called crocodiles lizards, ostriches sparrows, and obelisks meat-skewers, so they may very well have called the pyramids cakes. We seem to hear an echo of the slang of the mercenaries that carved their names on the colossus at Abu-Simbel.

[2] Three different positions of the equinox are given in three different Babylonian tablets, namely, 10°, 8° 15′, and 8° 0′ 30″ of Aries. (Kugler, *Mondrechnung*, p. 103; Ginzel, *Klio*, i. p. 205.) Given knowledge of this

We shall see that Thales probably knew the cycle which the Babylonians used to predict eclipses (§ 3); but it would be a mistake to suppose that the pioneers of Greek science had any detailed knowledge of the Babylonian astronomy. It was not till the time of Plato that even the names of the planets were known,[1] and the recorded observations were only made available in Alexandrian times. But, even if they had known these, their originality would remain. The Babylonians studied and recorded celestial phenomena for what we call astrological purposes, not from any scientific interest. There is no evidence at all that their accumulated observations ever suggested to them the least dissatisfaction with the primitive view of the world, or that they attempted to account for what they saw in any but the crudest way. The Greeks, on the other hand, with far fewer data to go upon, made at least three discoveries of capital importance in the course of two or three generations. In the first place, they discovered that the earth is a sphere and does not rest on anything. In the second

kind, and the practice of formulating recurrences in cycles, it is scarcely conceivable that the Babylonians should not have invented a cycle for precession. It is equally intelligible that they should only have reached a rough approximation; for the precessional period is really about 27,600 years and not 36,000. It is to be observed that Plato's "perfect year" is also 36,000 solar years (Adam's *Republic*, vol. ii. p. 302), and that it is probably connected with the precession of the equinoxes. (Cf. *Tim.* 39 d, a passage which is most easily interpreted if referred to precession.) This suggestion as to the origin of the "Great Year" was thrown out by Mr. Adam (*op. cit.* p. 305), and is now confirmed by Hilprecht, *The Babylonian Expedition of the University of Pennsylvania* (Philadelphia, 1906).

[1] In classical Greek literature, no planets but Ἕσπερος and Ἑωσφόρος are mentioned by name at all. Parmenides (or Pythagoras) first identified these as a single planet (§ 93). Mercury appears for the first time by name in *Tim.* 38 e, and the other divine names are given in *Epin.* 987 b sq., where they are said to be "Syrian." The Greek names Φαίνων, Φαέθων, Πυρόεις, Φωσφόρος, Στίλβων, may be older, but this cannot be proved.

place, they discovered the true theory of lunar and solar eclipses; and, in close connexion with this, they came to see, in the third place, that the earth is not the centre of our system, but revolves round it like the other planets. Not very much later, certain Greeks even took, at least tentatively, the final step of identifying the centre round which the earth and the planets revolve with the sun. These discoveries will be discussed in their proper place; they are only mentioned here to show the gulf between Greek astronomy and everything that had preceded it. The Babylonians had as many thousand years as the Greeks had centuries to make these discoveries, and it does not appear that they ever thought of one of them. The originality of the Greeks cannot be successfully questioned till it can be shown that the Babylonians had even an incorrect idea of what we call the solar system.

We may sum up all this by saying that the Greeks did not borrow either their philosophy or their science from the East. They did, however, get from Egypt certain rules of mensuration which, when generalised, gave birth to geometry; while from Babylon they learnt that the phenomena of the heavens recur in cycles with the greatest regularity. This piece of knowledge undoubtedly had a great deal to do with the rise of science; for to the Greek it suggested further questions such as the Babylonian did not dream of.[1]

[1] The Platonic account of this matter is to be found in the *Epinomis*, 986 e 9 sqq., and is summed up by the words λάβωμεν δὲ ὡς ὅτιπερ ἂν Ἕλληνες βαρβάρων παραλάβωσι, κάλλιον τοῦτο εἰς τέλος ἀπεργάζονται (987 d 9). The point is well put by Theon (Adrastos), *Exp.* p. 177, 20 Hiller, who speaks of the Chaldaeans and Egyptians as ἄνευ φυσιολογίας ἀτελεῖς

The scientific character of the early Greek cosmology.

XIII. It is necessary to say something as to the scientific worth of the philosophy we are about to study. We have just seen that the Eastern peoples were, at the time of which we write, considerably richer than the Greeks in accumulated facts, though these facts had certainly not been observed for any scientific purpose, and their possession never suggested a revision of the primitive view of the world. The Greeks, however, saw in them something that could be turned to account, and they were never as a people slow to act on the maxim, *Chacun prend son bien partout où il le trouve.* The most striking monument of this spirit which has come down to us is the work of Herodotos; and the visit of Solon to Croesus which he describes, however unhistorical it may be, gives a very lively and faithful picture of it. Croesus tells Solon that he has heard much of "his wisdom and his wanderings," and how, from love of knowledge (*φιλοσοφέων*), he has travelled over much land for the purpose of seeing what was to be seen (*θεωρίης εἵνεκεν*). The words *θεωρίη*, *φιλοσοφίη*, and *ἱστορίη* are, in fact, the catchwords of the time, though they had, we must remember, a somewhat different meaning from that which they were afterwards made to bear at Athens.[1] The idea that underlies them all may, perhaps, be best rendered in English by the word *Curiosity*; and it was just this

ποιούμενοι τὰς μεθόδους, δέον ἅμα καὶ φυσικῶς περὶ τούτων ἐπισκοπεῖν· ὅπερ οἱ παρὰ τοῖς Ἕλλησιν ἀστρολογήσαντες ἐπειρῶντο ποιεῖν, τὰς παρὰ τούτων λαβόντες ἀρχὰς καὶ τῶν φαινομένων τηρήσεις. The importance of this last passage is that it represents the view taken at Alexandria, where the facts were accurately known.

[1] Still, the word *θεωρία* never wholly lost its early associations, and the Greeks always felt that the *θεωρητικὸς βίος* meant literally "the life of the spectator." Its special use, and the whole theory of the "three lives," seem to be of Pythagorean origin. See my edition of Aristotle's *Ethics*, p. 19 n.

great gift of curiosity, and the desire to see all the wonderful things—pyramids, inundations, and so forth—that were to be seen, which enabled the Greeks to pick up and turn to their own use such scraps of knowledge as they could come by among the barbarians. No sooner did a Greek philosopher learn half a dozen geometrical propositions, and hear that the phenomena of the heavens recur in cycles, than he set to work to look for law everywhere in nature, and, with a splendid audacity, almost amounting to ὕβρις, to construct a system of the universe. We may smile, if we please, at the strange medley of childish fancy and true scientific insight which these Titanic efforts display, and sometimes we feel disposed to sympathise with the sages of the day who warned their more daring contemporaries "to think the thoughts befitting man's estate" (*ἀνθρώπινα φρονεῖν*). But we shall do well to remember at the same time that even now it is just such hardy anticipations of experience that make scientific progress possible, and that nearly every one of the early inquirers whom we are about to study made some permanent addition to the store of positive knowledge, besides opening up new views of the world in every direction.

There is no justification either for the idea that Greek science was built up solely by more or less lucky guesswork, instead of by observation and experiment. The nature of our tradition, which mostly consists of *Placita*—that is, of what we call "results"—tends, no doubt, to create this impression. We are seldom told why any early philosopher held the views he did, and the appearance of a string of "opinions" suggests dogmatism. There are, however, certain exceptions to the general character of the tradition; and we may

reasonably suppose that, if the later Greeks had been interested in the matter, there would have been many more. We shall see that Anaximander made some remarkable discoveries in marine biology, which the researches of the nineteenth century have fully confirmed (§ 21), and even Xenophanes supported one of his theories by referring to the fossils and petrifactions of such widely separated places as Malta, Paros, and Syracuse (§ 59). This is enough to show that the theory, so commonly held by the earlier philosophers, that the earth had been originally in a moist state, was not mythological in origin, but was based on, or at any rate confirmed by, biological and palaeontological observations of a thoroughly modern and scientific type. It would surely be absurd to imagine that the men who could make these observations had not the curiosity or the ability to make many others of which the memory is lost. Indeed, the idea that the Greeks were not observers is almost ludicrously wrong, as is proved by two simple considerations. The anatomical accuracy of Greek sculpture bears witness to trained habits of observation, and those of the highest order, while the fixing of the seasons by the heliacal rising and setting of the stars shows a familiarity with celestial phenomena which is by no means common at the present day.[1] We know, then, that the Greeks could observe well in matters affecting agriculture, navigation, and the arts, and we know that they were curious about the world. Is it conceivable that they did not use their powers of observation to gratify that curiosity? It is true, of course, that they had not our

[1] These two points are rightly emphasised by Staigmüller, *Beiträge zur Gesch. der Naturwissenschaften im klassischen Altertume* (Progr. Stuttgart, 1899, p. 8).

instruments of precision; but a great deal can be discovered by the help of very simple apparatus. It is not to be supposed that Anaximander erected his *gnomon* merely that the Spartans might know the seasons.[1]

Nor is it true that the Greeks made no use of experiment. The rise of the experimental method dates from the time when the medical schools began to influence the development of philosophy, and accordingly we find that the first recorded experiment of a modern type is that of Empedokles with the *klepsydra*. We have his own account of this (fr. 100), and we can see how it brought him to the verge of anticipating both Harvey and Torricelli. It is once more inconceivable that an inquisitive people should have applied the experimental method in a single case without extending it to the elucidation of other problems.

Of course the great difficulty for us is the geocentric hypothesis from which science inevitably started, though only to outgrow it in a surprisingly short time. So long as the earth is supposed to be in the centre of the world, meteorology, in the later sense of the word, is necessarily identified with astronomy. It is difficult for us to feel at home in this point of view, and indeed we have no suitable word to express what the Greeks at first called an *οὐρανός*. It will be convenient to use the word "world" for it; but then we must remember that it does not refer solely, or even chiefly,

[1] The gnomon was not a sundial, but an upright erected on a flat surface, in the centre of three concentric circles. These were drawn so that the end of the gnomon's shadow touched the innermost circle at midday on the summer solstice, the intermediate circle at the equinoxes, and the outermost circle at the winter solstice. See Bretschneider, *Die Geometrie vor Euklid*, p. 60.

to the earth. The later word *κόσμος* bears witness to the growth of scientific ideas. It meant at first the marshalling of an army, and next the ordered constitution of a state. It was transferred from this to the world because in early days the regularity and constancy of human life was far more clearly seen than the uniformity of nature. Man lived in a charmed circle of law and custom, but the world around him still seemed lawless. That, too, is why, when the regular course of nature was first realised, no better word for it could be found than *δίκη*. It is the same metaphor which still lives on in the expression "natural law."[1]

The science of the sixth century was mainly concerned, then, with those parts of the world that are "aloft" (*τὰ μετέωρα*), and these include, along with the heavenly bodies, such things as clouds, rainbows, and lightning. That is how the heavenly bodies came sometimes to be explained as ignited clouds, an idea which seems astonishing to us. But we must bear in mind that science inevitably and rightly began with the most obvious hypothesis, and that it was only the thorough working out of this that could show its inadequacy. It is just because the Greeks were the first people to take the geocentric hypothesis seriously that they were able to go beyond it. Of course the pioneers of Greek thought had no clear idea of the nature of scientific hypothesis, and supposed themselves to be dealing with ultimate reality. That was inevitable before the rise of Logic. At the same

[1] The term *κόσμος* seems to be Pythagorean in this sense. It was not familiar even at the beginning of the fourth century. Xenophon speaks of "what the sophists call the *κόσμος*" (*Mem.* i. 11). For *δίκη*, see below, §§ 14, 72.

time, a sure instinct guided them to the right method, and we can see how it was the effort to "save appearances"[1] that really operated from the first. It is, therefore, to those men that we owe the conception of an exact science which should ultimately take in the whole world as its object. They fancied—absurdly enough, no doubt—that they could work out this science at once. We sometimes make the same mistake nowadays; and it can no more rob the Greeks of the honour of having been the first to see the true, though perhaps unattainable, end of all science than it can rob our own scientific men of the honour of having brought that end nearer than it was. It is still knowledge of the kind foreseen and attempted by the Greeks that they are in search of.

Schools of philosophy.

XIV. Theophrastos, the first writer to treat the history of Greek philosophy in a systematic way,[2] represented the early cosmologists as standing to one another in the relation of master and scholar, and as members of regular societies. This has been regarded by many modern writers as an anachronism, and some have even denied the existence of "schools" of philosophy altogether. Such a reaction against the older view was quite justified in so far as it was directed against arbitrary classifications like the "Ionic" and "Italian" schools, which are derived through Laertios Diogenes from the Alexandrian writers of "Successions." But the express statements of Theophrastos are not

[1] This phrase originated in the school of Plato. The method of research in use there was for the leader to "propound" (*προτείνειν, προβάλλεσθαι*) it as a "problem" (*πρόβλημα*) to find the simplest "hypothesis" (*τίνων ὑποτεθέντων*) on which it is possible to account for and do justice to all the observed facts (*σῴζειν τὰ φαινόμενα*). It was in its French form, *sauver les apparences*, that the phrase acquired the meaning it usually has now.

[2] See Appendix, § 7.

to be so lightly set aside. As this point is of great importance, it will be necessary to elucidate it still further before we enter upon our story.

The modern view really rests upon a mistaken idea of the way in which civilisation develops. In almost every department of life, we find that the corporation at first is everything and the individual nothing. The peoples of the East hardly got beyond this stage at all; their science, such as it is, is anonymous, the inherited property of a caste or guild, and we still see clearly in some cases that it was once the same among the Hellenes. Medicine, for instance, was originally the "mystery" of the Asklepiads, and it is to be supposed that all craftsmen (*δημιουργοί*), amongst whom Homer classes the bards (*ἀοιδοί*), were at first organised in a similar way. What distinguished the Hellenes from other peoples was that at a comparatively early date these crafts came under the influence of outstanding individuals, who gave them a fresh direction and a new impulse. It is doubtless in some such way that we should understand the relation of Homer to the Homeridai. The Asklepiads at a later date produced Hippokrates, and if we knew more of such guilds as the Daidalids, it is likely we should find something of the same kind. But this does not destroy the corporate character of the craft; indeed, it rather intensifies it. The guild becomes what we call a "school," and the disciple takes the place of the apprentice. That is a vital change. A close guild with none but official heads is essentially conservative, while a band of disciples attached to a master they revere is the greatest progressive force the world knows.

It is certain that the later Athenian schools were

organised corporations, the oldest of which, the Academy, maintained its existence as such for some nine hundred years, and the only question we have to decide is whether this was an innovation made in the fourth century B.C., or rather the continuance of an old tradition. As it happens, we have the authority of Plato for speaking of the chief early systems as handed down in schools. He makes Sokrates speak of "the men of Ephesos," the Herakleiteans, as forming a strong body in his own day,[1] and the stranger of the *Sophist* and the *Statesman* speaks of his school as still in existence at Elea.[2] We also hear of "Anaxagoreans,"[3] and no one, of course, can doubt that the Pythagoreans were a society. In fact, there is hardly any school but that of Miletos for which we have not external evidence of the strongest kind; and even as regards it, we have the significant fact that Theophrastos speaks of philosophers of a later date as having been "associates of the philosophy of Anaximenes."[4] We shall see too in the first chapter that the internal evidence in favour of the existence of a Milesian school is very strong indeed. It is from this point of view, then, that we shall now proceed to consider the men who created Hellenic science.

[1] *Tht.* 179 e 4, *αὐτοῖς . . . τοῖς περὶ τὴν Ἔφεσον.* The humorous denial that the Herakleiteans had any disciples (180 b 8, *Ποίοις μαθηταῖς, ὦ δαιμόνιε*;) implies that this was the normal and recognised relation.

[2] *Soph.* 242 d 4, *τὸ . . . παρ' ἡμῖν Ἐλεατικὸν ἔθνος.* Cf. *ib.* 216 a 3, *ἑταῖρον δὲ τῶν ἀμφὶ Παρμενίδην καὶ Ζήνωνα* [*ἑταίρων*] (where *ἑταίρων* is probably interpolated, but gives the right sense); 217 a, 1, *οἱ περὶ τὸν ἐκεῖ τόπον.*

[3] *Crat.* 409 b 6, *εἴπερ ἀληθῆ οἱ Ἀναξαγόρειοι λέγουσιν.*

[4] Cf. Chap. VI. § 122; and, on the whole subject, see Diels, "Über die ältesten Philosophenschulen der Griechen" in *Philosophische Aufsätze Eduard Zeller gewidmet* (Leipzig, 1887).

CHAPTER I

THE MILESIAN SCHOOL

1. IT was at Miletos that the earliest school of scientific cosmology had its home. At the time it arose, the Milesians were in an exceptionally favourable position for scientific as well as commercial pursuits. They had, indeed, come into conflict more than once with the neighbouring Lydians, whose rulers were now bent upon extending their dominion to the coast; but, towards the end of the seventh century B.C., Thrasyboulos, tyrant of Miletos, had succeeded in making terms with King Alyattes, and an alliance was concluded between them, which not only saved Miletos for the present from a disaster like that which befell Smyrna, but secured it against molestation for the future. Even half a century later, when Croesus, resuming his father's forward policy, made war upon and conquered Ephesos, Miletos was still able to maintain the old treaty-relation, and never, strictly speaking, became subject to the Lydians at all. We can hardly doubt that the sense of security which this exceptional position would foster had something to do with the rise of scientific inquiry. Material prosperity is necessary as a foundation for the highest intellectual effort; and at this

Miletos and Lydia.

time Miletos was in possession of all the refinements of life to a degree unknown in continental Hellas.

Nor was it only in this way that the Lydian connexion would favour the growth of science at Miletos. What was called Hellenism at a later date seems to have been traditional in the dynasty of the Mermnadai. There may well be some truth in the statement of Herodotos, that all the "sophists" of the time flocked to the court of Sardeis.[1] The tradition which represents Croesus as what we should call the "patron" of Greek wisdom, was fully developed in the fifth century; and, however unhistorical its details may be, it must clearly have some sort of foundation in fact. Particularly noteworthy is "the common tale among the Greeks," that Thales accompanied him on his luckless campaign against Pteria, apparently in the capacity of military engineer. Herodotos, indeed, disbelieves the story that he diverted the course of the Halys;[2] but he does not attack it on the ground of any antecedent improbability, and it is quite clear that those who reported it found no difficulty in accepting the relation which it presupposes between the philosopher and the king.

[1] Herod. i. 29. Some other points may be noted in confirmation of what has been said as to the "Hellenism" of the Mermnadai. Alyattes had two wives, one of whom, the mother of Croesus, was a Karian; the other was an Ionian, and by her he had a son called by the Greek name Pantaleon (*ib.* 92). The offerings of Gyges were pointed out in the treasury of Kypselos at Delphoi (*ib.* 14), and those of Alyattes were one of the "sights" of the place (*ib.* 25). Croesus also showed great liberality to Delphoi (*ib.* 50), and to many other Greek shrines (*ib.* 92). He gave most of the pillars for the great temple at Ephesos. The stories of Miltiades (vi. 37) and Alkmeon (*ib.* 125) should also be mentioned in this connexion.

[2] Herod. i. 75. He disbelieves it because he had heard, probably from the Greeks of Sinope, of the great antiquity of the bridge on the royal road between Ankyra and Pteria (Ramsay, *Asia Minor*, p. 29). Xanthos recorded a tradition that it was Thales who induced Croesus to ascend his pyre when he knew a shower was coming (fr. 19).

It should be added that the Lydian alliance would greatly facilitate intercourse with Babylon and Egypt. Lydia was an advanced post of Babylonian culture, and Croesus was on friendly terms with the kings of both Egypt and Babylon. It is noteworthy, too, that Amasis of Egypt had the same Hellenic sympathies as Croesus, and that the Milesians possessed a temple of their own at Naukratis.[1]

I. Thales

2. There can be no doubt that the founder of the Milesian school, and therefore the first of the cosmologists, was Thales;[2] but all we can really be said to know of him comes from Herodotos, and the romance of the Seven Wise Men was already in existence when he wrote. He tells us, in the first place, that Thales was of Phoenician descent, a statement which other writers explained by saying he belonged to the Thelidai, a noble house descended from Kadmos and Agenor.[3] This is clearly connected with the view of Herodotos that there were "Kadmeians" from Boiotia among the original Ionian colonists, and it is certain that there really were people called Kadmeians in several Ionic cities.[4] Whether they were of Semitic origin is, of Origin.

[1] Milesians at Naukratis, Herod. ii. 178, where Amasis is said to have been φιλέλλην. He subscribed to the rebuilding of the temple at Delphoi after the great fire (*ib.* 180).

[2] Simplicius, indeed, quotes from Theophrastos the statement that Thales had many predecessors (*Dox.* p. 475, 11). This, however, need not trouble us; for the scholiast on Apollonios Rhodios (ii. 1248) tells us that Theophrastos made Prometheus the first philosopher, which is merely an application of Peripatetic literalism to a remark of Plato's (*Phileb.* 16 c 6). Cf. Appendix, § 2.

[3] Herod. i. 170 (R. P. 9 d.); Diog. i. 22 (R. P. 9).

[4] Strabo, xiv. pp. 633, 636; Pausan. vii. 2, 7. Priene was called Kadme, and the oldest annalist of Miletos bore the name Kadmos. See E. Meyer, *Gesch. des Alterth.* ii. § 158.

course, another matter. Herodotos probably mentions the supposed descent of Thales simply because he was believed to have introduced certain improvements in navigation from Phoenicia.[1] At any rate, the name Examyes, which his father bore, lends no support to the view that he was a Semite. It is a Karian name, and the Karians had been almost completely assimilated by the Ionians. On the monuments, we find Greek and Karian names alternating in the same families, and there is therefore no reason to suppose that Thales was anything else than an ordinary Milesian citizen, though perhaps with Karian blood in his veins.[2]

The eclipse foretold by Thales.

3. By far the most remarkable statement that Herodotos makes about Thales is that he foretold the eclipse of the sun which put an end to the war between the Lydians and the Medes.[3] Now, we may be sure that he was quite ignorant of the true cause of eclipses. Anaximander and his successors certainly were so,[4] and it is incredible that the right explanation should once have been given and then forgotten so soon. Even supposing, however, Thales had known the cause of eclipses, no one can believe that such scraps of elementary geometry as he picked up in Egypt would enable him to calculate one from the elements of the moon's path. Yet the evidence for the prediction is

[1] Diog. i. 23, Καλλίμαχος δ' *αὐτὸν οἶδεν εὑρετὴν τῆς ἄρκτου τῆς μικρᾶς λέγων ἐν τοῖς Ἰάμβοις οὕτως*—

> καὶ τῆς ἁμάξης ἐλέγετο σταθμήσασθαι
> τοὺς ἀστερίσκους, ᾗ πλέουσι Φοίνικες.

[2] See Diels, "Thales ein Semite?" (*Arch.* ii. 165 sqq.), and Immisch, "Zu Thales Abkunft" (*ib.* p. 515). The name Examyes occurs also in Kolophon (Hermesianax, *Leontion*, fr. 2, 38 Bgk.), and may be compared with other Karian names such as Cheramyes and Panamyes.

[3] Herod. i. 74.

[4] For the theories held by Anaximander and Herakleitos, see *infra*, §§ 19, 71.

too strong to be rejected off-hand. The testimony of Herodotos to an event which must have happened about a hundred years before his own birth may, perhaps, be deemed insufficient; but that of Xenophanes is a very different matter, and it is this we have really to deal with.[1] According to Theophrastos, Xenophanes was a disciple of Anaximander, and he may quite well have seen and spoken with Thales. In any case, he must have known scores of people who were able to remember what happened, and he had no conceivable interest in misrepresenting it. The prediction of the eclipse is really better attested than any other fact about Thales whatsoever, and the evidence for it is about as strong as for anything that happened in the early part of the sixth century B.C.

Now it is quite possible to predict eclipses without knowing their true cause, and there is no doubt that the Babylonians actually did so. On the basis of their astronomical observations, they had made out a cycle of 223 lunar months, within which eclipses of the sun and moon recurred at equal intervals of time.[2] This, it is true, would not enable them to predict eclipses of the sun for a given spot on the earth's surface; for these phenomena are not visible at all places where the sun is above the horizon at the time. We do not occupy a position at the centre of the earth, and what astronomers call the geocentric parallax has to be

[1] Diog. i. 23, *δοκεῖ δὲ κατά τινας πρῶτος ἀστρολογῆσαι καὶ ἡλιακὰς ἐκλείψεις καὶ τροπὰς προειπεῖν, ὥς φησιν Εὔδημος ἐν τῇ περὶ τῶν ἀστρολογουμένων ἱστορίᾳ, ὅθεν αὐτὸν καὶ Ξενοφάνης καὶ Ἡρόδοτος θαυμάζει.*

[2] The first to call attention to the Chaldaean cycle in this connexion seems to have been the Rev. George Costard, Fellow of Wadham College. See his *Dissertation on the Use of Astronomy in History* (London, 1764), p. 17. It is inaccurate to call it the *Saros*; that was quite another thing (see Ginzel, *Klio*, i. p. 377).

taken into account. It would only, therefore, be possible to tell by means of the cycle that an eclipse of the sun would be visible somewhere, and that it might be worth while to look out for it. Now, if we may judge from a report by a Chaldaean astronomer which has been preserved, this was just the position of the Babylonians. They watched for eclipses at the proper dates; and, if they did not occur, they announced the fact as a good omen.[1] To explain what we are told about Thales no more than this is required. He simply said there would be an eclipse; and, as good luck would have it, it was visible in Asia Minor, and on a striking occasion.

Date of Thales.

4. The prediction of the eclipse does not, then, throw much light upon the scientific attainments of Thales; but, if we can fix its date, it will give us a point from which to start in trying to determine the time at which he lived. Modern astronomers have calculated that there was an eclipse of the sun, probably visible in Asia Minor, on May 28 (O.S.), 585 B.C.,[2] while Pliny gives the date of the eclipse foretold by Thales as Ol. XLVIII. 4 (585/4 B.C.).[3] This, it is true, does not

[1] See George Smith, *Assyrian Discoveries* (1875), p. 409. The inscription which follows was found at Kouyunjik:—

"To the king my lord, thy servant Abil-Istar.

. . . .

"Concerning the eclipse of the moon of which the king my lord sent to me; in the cities of Akkad, Borsippa, and Nipur, observations they made, and then in the city of Akkad, we saw part. . . . The observation was made, and the eclipse took place.

. . . .

"And when for the eclipse of the sun we made an observation, the observation was made and it did not take place. That which I saw with my eyes to the king my lord I send."

[2] For the literature of this subject, see R. P. 8 b, adding Ginzel, *Spezieller Kanon*, p. 171. See also Milhaud, *Science grecque*, p. 62.

[3] Pliny, *N.H.* ii. 53.

exactly tally; for May 585 belongs to the year 586/5 B.C. It is sufficiently near, however, to justify us in identifying the eclipse as that of Thales, and this is confirmed by Apollodoros, who fixed his *floruit* in the same year.[1] The further statement that, according to Demetrios Phalereus, Thales "received the name of wise" in the archonship of Damasias at Athens, agrees very well with this, and is doubtless based on the story of the Delphic tripod; for the archonship of Damasias is the era of the restoration of the Pythian Games.[2]

Thales in Egypt.

5. The introduction of Egyptian geometry into Hellas is universally ascribed to Thales, and it is extremely probable that he did visit Egypt; for he had a theory of the inundations of the Nile. In a well-known passage,[3] Herodotos gives three explana-

[1] For Apollodoros, see Appendix, § 20. The dates in our text of Diogenes (i. 37; R. P. 8) cannot be reconciled with one another. That given for the death of Thales is probably right; for it is the year before the fall of Sardeis in 546/5 B.C., which is one of the regular eras used by Apollodoros. It no doubt seemed natural to make Thales die the year before the "ruin of Ionia" which he foresaw. Seventy-eight years before this brings us to 625/4 B.C. for the birth of Thales, and this gives us 585/4 B.C. for his fortieth year. That is Pliny's date for the eclipse, and Pliny's dates come from Apollodoros through Nepos. For a full discussion of the subject, see Jacoby, pp. 175 sqq.

[2] Diog. i. 22 (R. P. 9). I do not discuss the Pythian era and the date of Damasias here, though it appears to me that the last word has not yet been said upon the subject. Jacoby (pp. 170 sqq.) argues strongly for 582/1, the date now generally accepted. Others favour the Pythian year 586/5 B.C., which is the very year of the eclipse, and this would help to explain how those historians who used Apollodoros came to date it a year too late; for Damasias was archon for two years and two months. It is even possible that they misunderstood the words *Δαμασίου τοῦ δευτέρου*, which are intended to distinguish him from an earlier archon of the same name, as meaning "in the second year of Damasias." Apollodoros gave only Athenian archons, and the reduction to Olympiads is the work of later writers. Kirchner, adopting the year 582/1 for Damasias, brings the archonship of Solon down to 591/0 (*Rh. Mus.* liii. pp. 242 sqq.). But the date of Solon's archonship can never have been doubtful. On Kirchner's reckoning, we come to 586/5 B.C., if we keep the traditional date of Solon. See also E. Meyer, *Forschungen*, ii. pp. 242 sqq.

[3] Herod. ii. 20.

tions of the fact that this alone of all rivers rises in summer and falls in winter; but, as his custom is in such cases, he does not name their authors. The first of them, however, that which attributes the floods to the Etesian winds, is ascribed to Thales in the *Placita*,[1] and also by many later writers. Now, those statements are derived from a treatise on the Rise of the Nile attributed to Aristotle and known to the Greek commentators, but now extant only in a Latin epitome of the thirteenth century.[2] In this work the first of the three theories mentioned by Herodotos is ascribed to Thales, the second to Euthymenes of Massalia, and the third to Anaxagoras. Where did Aristotle, or whoever wrote the book, get these names? We think naturally once more of Hekataios, whom Herodotos so often reproduces without mentioning his name; and this conjecture is much strengthened when we find that Hekataios actually mentioned Euthymenes.[3] We may conclude, then, that Thales really was in Egypt; and, perhaps, that Hekataios, in describing the Nile, took account, as was only natural, of his distinguished fellow-citizen's views.

Thales and geometry.

6. As to the nature and extent of the mathematical knowledge brought back by Thales from Egypt, it seems desirable to point out that many writers have seriously misunderstood the character of the tradition.[4] In his commentary on the First Book of Euclid, Proclus enumerates, on the authority of Eudemos,

[1] Aet. iv. 1. 1 (*Dox.* p. 384).

[2] *Dox.* pp. 226-229. The Latin epitome will be found in Rose's edition of the Aristotelian fragments.

[3] Hekataios, fr. 278 (*F.H.G.* i. p. 19).

[4] See Cantor, *Vorlesungen über Geschichte der Mathematik*, vol. i. pp. 112 sqq.; Allman, "Greek Geometry from Thales to Euclid" (*Hermathena*, iii. pp. 164-174).

certain propositions which he says were known to Thales.[1] One of the theorems with which he credits him is that two triangles are equal when they have one side and the two adjacent angles equal. This he must have known, said Eudemos, as otherwise he could not have measured the distances of ships at sea from a watch-tower in the way he was said to have done.[2] Here we see how all these statements arose. Certain remarkable feats in the way of measurement were traditionally ascribed to Thales, and it was assumed that he must have known all the propositions which these imply. But this is quite an illusory method of inference. Both the measurement of the distance of ships at sea, and that of the height of the pyramids, which is also ascribed to him,[3] are easy applications of

[1] Proclus, *in Eucl.* pp. 65, 7; 157, 10; 250, 20; 299, 1; 352, 14; (Friedlein). Eudemos wrote the first histories of astronomy and mathematics, just as Theophrastos wrote the first history of philosophy.

[2] Proclus, p. 352, 14, *Εὔδημος δὲ ἐν ταῖς γεωμετρικαῖς ἱστορίαις εἰς Θαλῆν τοῦτο ἀνάγει τὸ θεώρημα* (*Eucl.* i. 26)· *τὴν γὰρ τῶν ἐν θαλάττῃ πλοίων ἀπόστασιν δι' οὗ τρόπου φασὶν αὐτὸν δεικνύναι τούτῳ προσχρῆσθαί φησιν ἀναγκαῖον.* For the method adopted by Thales, see Tannery, *Géométrie grecque*, p. 90. I agree, however, with Dr. Gow (*Short History of Greek Mathematics*, § 84) that it is very unlikely Thales reproduced and measured on land the enormous triangle which he had constructed in a perpendicular plane over the sea. Such a method would be too cumbrous to be of use. It is much simpler to suppose that he made use of the Egyptian *seqt*.

[3] The oldest version of this story is given in Diog. i. 27, *ὁ δὲ Ἱερώνυμος καὶ ἐκμετρῆσαί φησιν αὐτὸν τὰς πυραμίδας, ἐκ τῆς σκιᾶς παρατηρήσαντα ὅτε ἡμῖν ἰσομεγέθης ἐστίν.* Cf. Pliny, *H. Nat.* xxxvi. 82, *mensuram altitudinis earum deprehendere invenit Thales Milesius umbram metiendo qua hora par esse corpori solet.* (Hieronymos of Rhodes was contemporary with Eudemos.) This need imply no more than the simple reflexion that the shadows of all objects will probably be equal to the objects at the same hour. Plutarch (*Conv. sept. sap.* 147 a) gives a more elaborate method, *τὴν βακτηρίαν στήσας ἐπὶ τῷ πέρατι τῆς σκιᾶς ἣν ἡ πυραμὶς ἐποίει, γενομένων τῇ ἐπαφῇ τῆς ἀκτῖνος δυοῖν τριγώνων, ἔδειξας ὃν ἡ σκιὰ πρὸς τὴν σκιὰν λόγον εἶχε, τὴν πυραμίδα πρὸς τὴν βακτηρίαν ἔχουσαν.* This, as Dr. Gow points out, is only another calculation of *seqt*, and may very well have been the method of Thales.

what Aahmes calls the *seqt*. These rules of mensuration may well have been brought from Egypt by Thales, but we have no ground for supposing that he knew any more about their *rationale* than did the author of the Rhind papyrus. Perhaps, indeed, he gave them a wider application than the Egyptians had done. Still, mathematics, properly so called, did not come into existence till some time after Thales.

Thales as a politician.

7. Thales appears once more in the pages of Herodotos some time before the fall of the Lydian empire. He is said to have urged the Ionian Greeks to unite in a federal state with its capital at Teos.[1] We shall have occasion to notice more than once in the sequel that the early schools of philosophy were in the habit of trying to influence the course of political events; and there are many things, for instance the part played by Hekataios in the Ionian revolt, which point to the conclusion that the scientific men of Miletos took up a very decided position in the stirring times that followed the death of Thales. It is this political action which has gained the founder of the Milesian school his undisputed place among the Seven Wise Men; and it is owing mainly to his inclusion among those worthies that the numerous anecdotes which were told of him in later days attached themselves to his name.[2]

Uncertain character of the tradition.

8. If Thales ever wrote anything, it soon was lost, and the works which were written in his name did not, as a rule, deceive even the ancients.[3] Aristotle

[1] Herod. i. 170 (R. P. 9 d).

[2] The story of Thales falling into a well (Plato, *Tht.* 174 a) is nothing but a fable teaching the uselessness of σοφία; the anecdote about the "corner" in oil (Ar. *Pol.* A, 11. 1259 a 6) is intended to inculcate the opposite lesson.

[3] See R. P. 9 e.

professes to know something about the views of Thales; but he does not pretend to know how they were arrived at, nor the arguments by which they were supported. He does, indeed, make certain suggestions, which are repeated by later writers as statements of fact; but he himself simply gives them for what they are worth.[1] There is another difficulty in connexion with the tradition. Many a precise-looking statement in the *Placita* has no other foundation than the habit of ascribing any doctrine which was, roughly speaking, characteristic of the whole Ionic "Succession" to "Thales and his followers," and so producing the appearance of a definite statement about Thales. But, in spite of all this, we need not doubt that Aristotle was correctly informed with regard to the leading points. We have seen traces of reference to Thales in Hekataios, and nothing can be more likely than that later writers of the school should have quoted the views of its founder. We may venture, therefore, upon a conjectural restoration of his cosmology, in which we shall be guided by what we know for certain of the subsequent development of the Milesian school; for we should naturally expect to find its characteristic doctrines at least foreshadowed in the teaching of its earliest representative. But all this must be taken for just what it is worth; speaking strictly, we do not know anything about the teaching of Thales at all.

Conjectural account of the cosmology of Thales.

9. The statements of Aristotle may be reduced to three:

(1) The earth floats on the water.[2]

[1] R. P. *ib.*

[2] Arist. *Met.* A, 3. 983 b 21 (R. P. 10); *de Caelo*, B, 13. 294 a 28 (R. P. 11). Later writers add that he gave this as an explanation of earthquakes (so Aet. iii. 15, 1); but this is probably due to a "Homeric allegorist"

(2) Water is the material cause[1] of all things.

(3) All things are full of gods. The magnet is alive; for it has the power of moving iron.[2]

The first of these statements must be understood in the light of the second, which is expressed in Aristotelian terminology, but would undoubtedly mean that Thales had said water was the fundamental or primary thing, of which all other things were mere transient forms. It was, we shall see, just such a primary substance that the Milesian school as a whole was seeking, and it is unlikely that the earliest answer to the great question of the day should have been the comparatively subtle one given by Anaximander. We are, perhaps, justified in holding that the greatness of Thales consisted in this, that he was the first to ask, not what *was* the original thing, but what *is* the primary thing now; or, more simply still, "What is the world made of?" The answer he gave to this question was: *Water*.

Water. 10. Aristotle and Theophratos, followed by Simplicius and the doxographers, suggest several explanations of this answer. By Aristotle these explanations are given as conjectural; it is only later writers that repeat them as if they were quite certain.[3] The most

(Appendix, § 11), who wished to explain the epithet ἐννοσίγαιος. Cf. Diels, *Dox.* p. 225.

[1] *Met.* A, 3. 983 b 20 (R. P. 10). I have said "material cause," because τῆς τοιαύτης ἀρχῆς (b 19) means τῆς ἐν ὕλης εἴδει ἀρχῆς (b 7).

[2] Arist. *de An.* A, 5. 411 a 7 (R. P. 13); *ib.* 2. 405 a 19 (R. P. 13 a). Diog. i. 24 (R. P. *ib.*) adds amber. This comes from Hesychios of Miletos; for it occurs in the scholium of Par. A on Plato, *Rep.* 600 a.

[3] *Met.* A, 3. 983 b 22; Aet. i. 3, 1; Simpl. *Phys.* p. 36, 10 (R. P. 10, 12, 12 a). The last of the explanations given by Aristotle, namely, that Thales was influenced by early cosmogonical theories about Okeanos and Tethys, has strangely been supposed to be more historical than the rest, whereas it is merely a fancy of Plato's taken literally. Plato says more than once (*Tht.* 180 d 2; *Crat.* 402 b 4) that Herakleitos and his predecessors (οἱ ῥέοντες) derived their philosophy from Homer (*Il.* xiv. 201), and even

probable view of them seems to be that Aristotle simply ascribed to Thales the arguments used at a later date by Hippon of Samos in support of a similar thesis.[1] This would account for their physiological character. The rise of scientific medicine had made biological arguments very popular in the fifth century; but, in the days of Thales, the prevailing interest was not physiological, but rather what we should call meteorological, and it is therefore from this point of view we must try to understand the theory.

Now it is not very hard to see how considerations of a meteorological kind may have led Thales to adopt the view he did. Of all the things we know, water seems to take the most various shapes. It is familiar to us in a solid, a liquid, and a vaporous form, and so Thales may well have thought that he saw the world-process from water and back to water again going on before his very eyes. The phenomenon of evaporation naturally suggests everywhere that the fire of the heavenly bodies is kept up by the moisture which they draw from the sea. Even at the present day, the country people speak of the appearance of sunbeams as "the sun drawing water." Water comes down again in the rain; and lastly, so the early cosmologists thought,



earlier sources (Orph. frag. 2, Diels, *Vors.* 1st ed. p. 491). In quoting this suggestion, Aristotle refers it to "some"—a word which often means Plato—and he calls the originators of the theory παμπαλαίους, as Plato had done (*Met.* 983 b 28; cf. *Tht.* 181 b 3). This is a characteristic example of the way in which Aristotle gets history out of Plato. See Appendix, § 2.

[1] Compare Arist. *de An.* A, 2. 405 b 2 (R. P. 220) with the passages referred to in the last note. The same suggestion is made in Zeller's fifth edition (p. 188, n. 1), which I had not seen when the above was written. Döring, "Thales" (*Zschr. f. Philos.* 1896, pp. 179 sqq.), takes the same view. We now know that, though Aristotle declines to consider Hippon as a philosopher (*Met.* A, 3. 984 a 3; R. P. 219 a), he was discussed in the history of medicine known as Menon's *Iatrika*. See Diels in *Hermes*, xxviii. p. 420.

it turns to earth. This seems strange to us, but it may have seemed natural enough to men who were familiar with the river of Egypt which had formed the Delta, and with the torrents of Asia Minor, which bring down unusually large alluvial deposits. At the present day the Gulf of Latmos, on which Miletos used to stand, is completely filled up. Lastly, they thought, earth turns once more to water—an idea derived from the observation of dew, night-mists, and subterranean springs. For these last were not in early times supposed to have anything at all to do with the rain. The "waters under the earth" were regarded as an entirely independent source of moisture.[1]

Theology. 11. The third of the statements mentioned above is supposed by Aristotle himself to imply that Thales believed in a "soul of the world," though he is careful to mark this as no more than an inference.[2] The doctrine of the world-soul is then attributed quite positively to Thales by Aetios, who gives it in the Stoic phraseology which he found in his immediate source, and identifies the world-intellect with God.[3] Cicero found a similar account of the matter in the Epicurean manual which he followed, but he goes a step further. Eliminating the Stoic pantheism, he turns the world-intellect into a Platonic *demiourgos*, and says that Thales held there was a divine mind which formed all things out of water.[4] All this is derived

[1] The view here taken most resembles that of the "Homeric allegorist" Herakleitos (R. P. 12 a). That, however, is also a conjecture, probably of Stoic, as the others are of Peripatetic, origin.

[2] Arist. *de An.* A, 5. 411 a 7 (R. P. 13).

[3] Aet. i. 7, 11 = Stob. i. 56 (R. P. 14). On the sources here referred to, see Appendix, §§ 11, 12.

[4] Cicero, *de Nat. D.* i. 25 (R. P. 13 b). On Cicero's source, see *Dox.* pp. 125, 128. The Herculanean papyrus of Philodemos is, unfortunately,

from the cautious statement of Aristotle, and can have no greater authority than its source. We need not enter, then, upon the old controversy whether Thales was an atheist or not. It is really irrelevant. If we may judge from his successors, he may very possibly have called water divine; but, if he had any religious beliefs at all, we may be sure they were quite unconnected with his cosmological theory.

Nor must we make too much of the saying itself that "all things are full of gods." It is often supposed to mean that Thales attributed a "plastic life" to matter, or that he was a "hylozoist." We have seen already how misleading this way of speaking is apt to be,[1] and we shall do well to avoid it. It is not safe to regard such an apophthegm as evidence for anything; the chances are that it belongs to Thales as one of the Seven Wise Men, rather than as founder of the Milesian school. Further, such sayings are, as a rule, anonymous to begin with, and are attributed now to one sage and now to another.[2] On the other hand, it is extremely probable that Thales did say that the magnet and amber had souls. That is no apophthegm, but something more on the level of the statement that the earth floats on the water. It is, in fact, just the sort of thing we should expect Hekataios to record about Thales. It would be wrong, however, to draw any inferences from it as to his view of the world; for

defective just at this point, but it is not likely that the Epicurean manual anticipated Cicero's mistake.

[1] See Introd. § VIII.

[2] Plato refers to the saying πάντα πλήρη θεῶν in *Laws*, 899 b 9 (R. P. 14 b), without mentioning Thales. That ascribed to Herakleitos in the *de part. An.* A, 5. 645 a 17 seems to be a mere variation on it. So in Diog. ix. 7 (R. P. 46 d) Herakleitos is credited with the saying πάντα ψυχῶν εἶναι κα δαιμόνων πλήρη.

to say that the magnet and amber are alive is to imply, if anything, that other things are not.[1]

II. Anaximander

Life. 12. The next name that has come down to us is that of Anaximander, son of Praxiades. He too was a citizen of Miletos, and Theophrastos described him as an "associate" of Thales.[2] We have seen how that expression is to be understood (§ XIV.).

According to Apollodoros, Anaximander was sixty-four years old in Ol. LVIII. 2 (547/6 B.C.); and this is confirmed by Hippolytos, who says he was born in Ol. XLII. 3 (610/9 B.C.), and by Pliny, who assigns his discovery of the obliquity of the zodiac to the same Olympiad.[3] We seem to have here something more than a mere combination of the ordinary type; for, according to all the rules of Alexandrian chronology, Anaximander should have "flourished" in 565 B.C., that is, just half-way between Thales and Anaximenes, and this would make him sixty, not sixty-four, in 546. Now Apollodoros appears to have said that he had met with the work of Anaximander; and his reason for mentioning this must be that he found in it some indication which enabled him to fix its date without having recourse to conjecture. Diels suggests that Anaximander may have given his age at the time of writing as sixty-four, and that the book may have

[1] Bäumker, *Das Problem der Materie*, p. 10, n. 1.

[2] R. P. 15 d. That the words πολίτης καὶ ἑταῖρος, given by Simplicius, *de Caelo*, p. 615, 13, are the original words of Theophrastos is shown by the agreement of Cic. *Acad.* ii. 118, *popularis et sodalis*. The two passages represent quite independent branches of the tradition. See Appendix, §§ 7, 12.

[3] Diog. ii. 2 (R. P. 15); Hipp. *Ref.* i. 6 (*Dox.* p. 560); Plin. *N.H.* ii. 31. Pliny's dates come from Apollodoros through Nepos.

contained some other statement showing it to have been published in 547/6 B.C.[1] Perhaps, however, this hardly does justice to the fact that the year given is just that which preceded the fall of Sardeis and the subjugation of the Lydian empire by the Persians. It may be a more plausible conjecture that Anaximander, writing some years later, incidentally mentioned what his age had been at the time of that great crisis. We know from Xenophanes that the question, "How old were you when the Mede appeared?" was considered an interesting one in those days.[2] At all events, we seem to be justified in believing that Anaximander was a generation younger than Thales. When he died we do not really know.[3]

Like his predecessor, Anaximander distinguished himself by certain practical inventions. Some writers credited him with that of the *gnomon*; but that can hardly be correct. Herodotos tells us this instrument came from Babylon, so perhaps it was Anaximander who made it known among the Greeks. He was also the first to construct a map, and Eratosthenes said this was the map elaborated by Hekataios.[4]

[1] *Rhein. Mus.* xxxi. p. 24.

[2] Xenophanes, fr. 22 (fr. 17, Karsten; R. P. 95 a). Jacoby (p. 190) thinks that Apollodoros fixed the *floruit* of Anaximander forty years before that of Pythagoras, that is, in 572/1 B.C., and that the statement as to his age in 547/6 is a mere inference from this.

[3] The statement that he "died soon after" (Diog. ii. 2; R. P. 15) seems to mean that Apollodoros made him die in the year of Sardeis (546/5), one of his regular epochs. If this is so, Apollodoros cannot have said also that he flourished in the days of Polykrates, and Diels is probably right in supposing that this notice refers to Pythagoras and has been inserted in the wrong place.

[4] For the gnomon, see Introd. p. 31, n. 1; and cf. Diog. ii. 1 (R. P. 15); Herod. ii. 109 (R. P. 15 a). Pliny, on the other hand, ascribes the invention of the gnomon to Anaximenes (*N.H.* ii. 87). The truth seems to be that the erection of celebrated gnomons was traditionally ascribed to certain philosophers. That of Delos was referred to Pherekydes. For

Theophrastos on Anaximander's theory of the primary substance.

13. Nearly all we know of Anaximander's system is derived in the last resort from Theophrastos.[1] As to the credibility of what we are told on his authority, it is enough to remark that the original work, which was in the hands of Apollodoros, must certainly have existed in the time of Theophrastos. Moreover, he seems once at least to have quoted Anaximander's own words, and he criticised his style. Here are the remains of what he said of him in the First Book:—

Anaximander of Miletos, son of Praxiades, a fellow-citizen and associate of Thales,[2] said that the material cause and first element of things was the Infinite, he being the first to introduce this name for the material cause. He says it is neither water nor any other of the so-called[3] elements, but a substance different from them which is infinite, from which arise all the heavens and the worlds within them.—*Phys. Op.* fr. 2 (*Dox.* p. 476; R. P. 16).

He says that this is eternal and ageless, and that it encompasses all the worlds.—Hipp. *Ref.* i. 6 (R. P. 17 a).

And into that from which things take their rise they pass away once more, "as is ordained; for they make reparation and satisfaction to one another for their injustice according to the appointed time," as he says[4] in these somewhat poetical terms.—*Phys. Op.* fr. 2 (R. P. 16).

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the map see Agathemeros, i. 1, Ἀναξίμανδρος ὁ Μιλήσιος ἀκουστὴς Θαλέω πρῶτος ἐτόλμησε τὴν οἰκουμένην ἐν πίνακι γράψαι, μεθ' ὃν Ἑκαταῖος ὁ Μιλήσιος ἀνὴρ πολυπλανὴς διηκρίβωσεν, ὥστε θαυμασθῆναι τὸ πρᾶγμα. This is from Eratosthenes. Cf. Strabo, i. p. 7.

[1] See the conspectus of extracts from Theophrastos given by Diels, *Dox.* p. 133; *Vors.* pp. 13 sqq. In this and other cases, where the words of the original have been preserved by Simplicius, I have given them alone. On the various writers quoted, see Appendix, §§ 9 sqq.

[2] Simplicius says "successor and disciple" (διάδοχος καὶ μαθητής) in his Commentary on the *Physics*; but see above, p. 52, n. 2.

[3] For the expression τὰ καλούμενα στοιχεῖα, see Diels, *Elementum*, p. 25, n. 4. In view of this, we must keep the MS. reading εἶναι, instead of writing νυνί with Usener.

[4] Diels (*Vors.* p. 13) begins the actual quotation with the words ἐξ ὧν δὲ ἡ γένεσις . . . The Greek practice of blending quotations with the text

And besides this, there was an eternal motion, in the course of which was brought about the origin of the worlds.—Hipp. *Ref.* i. 6 (R. P. 17 a).

He did not ascribe the origin of things to any alteration in matter, but said that the oppositions in the substratum, which was a boundless body, were separated out.—Simpl. *Phys.* p. 150, 20 (R. P. 18).

The primary substance is not one of the "elements."

14. Anaximander taught, then, that there was one eternal, indestructible substance out of which everything arises, and into which everything once more returns; a boundless stock from which the waste of existence is continually being made good. This is only the natural development of the thought we have ventured to ascribe to Thales, and there can be no doubt that Anaximander at least distinctly formulated it. Indeed, we can still follow to some extent the reasoning which led him to do so. Thales had regarded water as the most likely of all the things we know to be that of which all others are forms; Anaximander appears to have asked himself how the primary substance could be one of these particular things. His argument seems to be preserved by Aristotle, who has the following passage in his discussion of the Infinite:—

Further, there cannot be a single, simple body which is infinite, either, as some hold, one distinct from the elements, which they then derive from it, nor without this qualification. For there are some who make this (*i.e.* a body distinct from the elements) the infinite, and not air or water, in order that the other things may not be destroyed by their infinity. *They are in opposition one to another*—air is cold, water moist, and fire hot—and therefore, *if any one of them were infinite, the rest would have ceased to be by this time.* Accordingly they

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tells against this. It is very rare for a Greek writer to open a verbal quotation abruptly. Further, it is safer not to ascribe the terms γένεσις and φθορά in their technical Platonic sense to Anaximander.

say that what is infinite is something other than the elements, and from it the elements arise.—Arist. *Phys.* Γ, 5. 204 b 22 (R. P. 16 b).

It is clear that in this passage Anaximander is contrasted with Thales and with Anaximenes. Nor is there any reason to doubt that the account given of his reasoning is substantially correct, though the form is Aristotle's own, and the mention of "elements" is an anachronism.[1] Anaximander was struck, it would seem, by the opposition and strife between the things which go to make up the world; the warm fire was opposed to the cold air, the dry earth to the moist sea. These opposites were at war, and any predominance of one over the other was an "injustice" for which they must make reparation to one another.[2] We may suppose that his thoughts ran somewhat as follows. If Thales had been right in saying that water was the fundamental reality, it would not be easy to see how anything else could ever have existed. One side of the opposition, the cold and moist, would have had its way unchecked, injustice would have prevailed, and the warm and dry would have been driven from the field long ago. We must, then, have something which is not itself one of the warring opposites we know, something more primitive, out of which they arise, and into which they once more pass away. That Anaximander called this something by the name of φύσις, is clear

[1] The conception of elements is not older than Empedokles (§ 106), and the word στοιχεῖα, which is properly translated by *elementa*, was first used in this sense by Plato. For the history of the term, see Diels, *Elementum* (1899).

[2] The important word ἀλλήλοις was omitted in the Aldine Simplicius, but is in all the MSS. We shall see that in Herakleitos "justice" means the observance of an equal balance between what were called later the elements (§ 72). See also Introd. p. 32, n. 1.

from the doxographers; the current statement that the word ἀρχή in the sense of a "first principle" was introduced by him, is probably due to a misunderstanding of what Theophrastos said.[1]

15. It was natural for Aristotle to regard this theory as an anticipation or presentiment of his own doctrine of "indeterminate matter."[2] He knew very well, of course, that he himself was the author of that; but it is in accordance with his method to represent his own theories as the distinct formulation of truths which earlier thinkers had only guessed at. It was to be expected, then, that he should sometimes express the views of Anaximander in terms of the theory of "elements." He knew too that the Boundless was a body,[3] though in his own system there was no room for anything corporeal prior to the elements; so he had to speak of it as a boundless body "alongside of" or "distinct from" the elements (*παρὰ τὰ στοιχεῖα*). So Aristotle's account of the theory.

[1] If the words quoted from Theophrastos by Simplicius, *Phys.* p. 24, 15 (R. P. 16), stood by themselves, no one would ever have supposed them to mean that Anaximander called the Boundless ἀρχή. They would naturally be rendered: "having been the first to introduce this name (*i.e.* τὸ ἄπειρον) for the ἀρχή"; but the words of Hippolytos (*Ref.* i. 6, 2), πρῶτος τοὔνομα καλέσας τῆς ἀρχῆς, have led nearly all writers to take the passage in the less obvious sense. We now know, however, that Hippolytos is no independent authority, but rests altogether on Theophrastos; so the natural view to take is that either his immediate source, or he himself, or a copyist, has dropped out τοῦτο before τοὔνομα, and corrupted κομίσας into καλέσας. It is not credible that Theophrastos made both statements. The other passage from Simplicius compared by Usener (p. 150, 23), πρῶτος αὐτὸς ἀρχὴν ὀνομάσας τὸ ὑποκείμενον, does not seem to me to have anything to do with the question. It means simply that Anaximander was the first to name the substratum as the "material cause," which is a different point altogether. This is how Neuhäuser takes the passage (*Anaximander*, pp. 7 sqq.); but I cannot agree with him in holding that the *word* ὑποκείμενον is ascribed to the Milesian.

[2] Arist. *Met.* Λ, 2. 1069 b 18 (R. P. 16 c).

[3] This is taken for granted in *Phys.* Γ, 4. 203 a 16; 204 b 22 (R. P. 16 b), and stated in Γ, 8. 208 a 8 (R. P. 16 a). Cf. Simpl. *Phys.* p. 150, 20 (R. P. 18).

far as I know, no one has doubted that, when he uses this phrase, he is referring to Anaximander.

In a number of other places Aristotle speaks of a thinker, whom he does not happen to name, who held that the primary substance was something "intermediate between" the elements or between two of them.[1] Nearly all the Greek commentators referred this to Anaximander also, but most modern writers refuse to follow them. It is, no doubt, easy to show that Anaximander can have never meant to describe the Boundless in this way, but that is no real objection to the older interpretation. It is difficult to see that it is more of an anachronism to call the Boundless "intermediate between the elements" than to say that it is "distinct from the elements"; and indeed, if once we introduce the elements at all, the former description is in some ways the more adequate of the two. At any rate, if we refuse to understand these passages as referring to Anaximander, we shall have to say that Aristotle paid a great deal of attention to some early thinker, whose very name has been lost, and who not only agreed with some of Anaximander's views, but also, as is shown by one passage, used some of his most characteristic expressions.[2] We may add that in one

[1] Aristotle speaks four times of something intermediate between Fire and Air (*Gen. Corr.* B, 1. 328 b 35; *ib.* 5. 332 a 21; *Phys.* A, 4. 187 a 14; *Met.* A, 7. 988 a 30). In five places we have something intermediate between Water and Air (*Met.* A, 7. 988 a 13; *Gen. Corr.* B, 5. 332 a 21; *Phys.* Γ, 4. 203 a 18; *ib.* 5. 205 a 27; *de Caelo*, Γ, 5. 303 b 12). Once (*Phys.* A, 6. 189 b 1) we hear of something between Water and Fire. This variation shows at once that he is not speaking historically. If any one ever held the doctrine of *τὸ μεταξύ*, he must have known perfectly well which two elements he meant.

[2] Arist. *de Caelo*, Γ, 5. 303 b 12, *ὕδατος μὲν λεπτότερον, ἀέρος δὲ πυκνότερον, ὃ περιέχειν φασὶ πάντας τοὺς οὐρανοὺς ἄπειρον ὄν*. That this refers to Idaios of Himera, as suggested by Zeller (p. 258), seems very improbable. Aristotle nowhere mentions his name, and the tone

or two places Aristotle certainly seems to identify the "intermediate" with the something "distinct from" the elements.[1]

There is even one place in which he appears to speak of Anaximander's Boundless as a "mixture," though his words may perhaps admit of another interpretation.[2] But this is of no consequence for our interpretation of Anaximander himself. It is certain that he cannot have said anything about "elements," which no one thought of before Empedokles, and no one could think of before Parmenides. The question has only been mentioned at all because it has been the subject of a lengthy controversy,[3] and because it throws great light on the historical value of Aristotle's statements. From the point of view of his own system, these are abundantly justified; but we shall have to remember in other cases that, when he seems to attribute an idea to some earlier thinker, we are not in the least bound to believe what he says in a historical sense.

The primary substance is infinite.

16. Anaximander's reason for conceiving the

of his reference to Hippon in *Met.* A, 3. 984 a 3 (R. P. 219 a) shows that he was not likely to pay so much attention to the *ἐπίγονοι* of the Milesian school.

[1] Cf. *Phys.* Γ, 5. 204 b 22 (R. P. 16 b), where Zeller rightly refers *τὸ παρὰ τὰ στοιχεῖα* to Anaximander. Now, at the end (205 a 25) the whole passage is summarised thus: *καὶ διὰ τοῦτ' οὐθεὶς τὸ ἓν καὶ ἄπειρον πῦρ ἐποίησεν οὐδὲ γῆν τῶν φυσιολόγων, ἀλλ' ἢ ὕδωρ ἢ ἀέρα ἢ τὸ μέσον αὐτῶν.* In *Gen. Corr.* B, 1. 328 b 35 we have first *τι μεταξὺ τούτων σῶμά τε ὂν καὶ χωριστόν*, and a little further on (329 a 9) *μίαν ὕλην παρὰ τὰ εἰρημένα.* In B, 5. 332 a 20 we have *οὐ μὴν οὐδ' ἄλλο τί γε παρὰ ταῦτα, οἷον μέσον τι ἀέρος καὶ ὕδατος ἢ ἀέρος καὶ πυρός.*

[2] *Met.* Λ, 2. 1069 b 18 (R. P. 16 c). Zeller (p. 205, n. 1) assumes an "easy zeugma." I should prefer to say that *καὶ Ἐμπεδοκλέους τὸ μῖγμα* was an afterthought, and that Aristotle really meant *τὸ Ἀναξαγόρου ἓν . . . καὶ Ἀναξιμάνδρου.* *Phys.* A, 4. 187 a 20 does not assign the "mixture" to Anaximander.

[3] For the literature of this controversy, see R. P. 15. A good deal of light is thrown on this and similar questions by W. A. Heidel, "Qualitative Change in Pre-Socratic Philosophy" (*Arch.* xix. p. 333).

primary substance as boundless was, no doubt, that indicated by Aristotle, namely, "that becoming might not fail."[1] It is not likely, however, that these words are his own, though the doxographers speak as if they were. It is enough for us to know that Theophrastos, who had seen his book, attributed the thought to him. And certainly the way in which he regarded the world would bring home to him with more than common force the need of a boundless stock of matter. The "opposites" of which our world consists are, we have seen, at war with one another, and their strife is marked by "unjust" encroachments on either side. The warm commits "injustice" in summer, the cold in winter. To redress the balance, they must be absorbed once more in their common ground; and this would lead in the long run to the destruction of everything but the Boundless itself, if there were not an inexhaustible supply of it from which opposites might continually be separated out afresh. We must picture to ourselves, then, an endless mass, which is not any one of the opposites we know, stretching out without limit on every side of the heavens which bound the world we live in.[2] This mass is a body, and out of it our world

[1] *Phys.* Γ, 8. 208 a 8 (R. P. 16 a). That this refers to Anaximander is shown by Aet. i. 3, 3 (R. P. 16 a). The same argument is given in *Phys.* Γ, 4. 203 b 18, a passage where Anaximander has just been quoted by name, *τῷ οὕτως ἂν μόνον μὴ ὑπολείπειν γένεσιν καὶ φθοράν, εἰ ἄπειρον εἴη ὅθεν ἀφαιρεῖται τὸ γιγνόμενον.* I cannot, however, believe that the arguments given at the beginning of this chapter (203 b 7; R. P. 17) are Anaximander's. They bear the stamp of the Eleatic dialectic, and are, in fact, those of Melissos.

[2] I have assumed that the word *ἄπειρον* means *spatially infinite* (though not in any precise mathematical sense), not *qualitatively indeterminate*, as maintained by Teichmüller and Tannery. The decisive reasons for holding that the sense of the word is "boundless in extent" are as follows: (1) Theophrastos said that the primary substance of Anaximander was *ἄπειρον* and contained all the worlds, and the word *περιέχειν* everywhere means

once emerged by the "separating out" of the opposites, which one day will all be absorbed again in the Boundless, and our world will cease to be.

17. The doxographers say it was the "eternal motion" that brought into being "all the heavens and all the worlds within them." As we have seen (§ VIII.), it is not likely that Anaximander himself used the phrase "eternal motion." That is rather Aristotle's own version of what he found stated about the "separating out" of opposites. We are not told expressly how Anaximander conceived this to operate, but the term "separating out" suggests some process of shaking and sifting as in a sieve. Now it is just such a process that Plato makes the Pythagorean Timaios describe, and the most probable theory is certainly that here, as in many other cases, he has reproduced a genuinely early view. As we shall see, it is quite likely that the Pythagoreans should have followed Anaximander in this.[1] In any case, it is wrong to identify the "eternal motion" with the diurnal revolution of the heavens, as has sometimes been done. That motion cannot possibly be eternal, for the simple reason that the heavens themselves are perishable. Aristotle says, indeed, that all who believe the world has come into being represent The eternal motion.

"to encompass," not, as has been suggested, "to contain potentially." (2) Aristotle says (*Phys.* Γ, 4. 203 b 23) *διὰ γὰρ τὸ ἐν τῇ νοήσει μὴ ὑπολείπειν καὶ ὁ ἀριθμὸς δοκεῖ ἄπειρος εἶναι καὶ τὰ μαθηματικὰ μεγέθη καὶ τὰ ἔξω τοῦ οὐρανοῦ· ἀπείρου δ' ὄντος τοῦ ἔξω, καὶ σῶμα ἄπειρον εἶναι δοκεῖ καὶ κόσμοι.* (3) Anaximander's theory of the *ἄπειρον* was adopted by Anaximenes, and he identified it with Air, which is not qualitatively indeterminate.

[1] Plato, *Tim.* 52 e, where the elements are separated by being shaken, stirred, and carried in different directions: "just as by sieves and instruments for winnowing corn, the grain is shaken and sifted, and the dense and heavy parts go one way, and the rare and light are carried to a different place and settle there." For the relation of Pythagoreanism to Anaximander, see below, § 53.

the earth as having been forced into the centre by the circular motion;[1] but, though this doubtless refers to Anaximander among others, it is quite irrelevant here. It has to do only with the formation of the world after it has been once for all separated off and enclosed in its own heaven, and we shall have to remember it when we come to that part of the theory. At present, we have only to do with the motion of the Boundless itself; and, if we wish to picture that, it is much safer to regard it as a sort of shaking up and down which sorts out the opposites from the infinite mass.

The innumerable worlds.

18. We are told more than once that Anaximander believed there were "innumerable worlds in the Boundless,"[2] and it is now usual to regard these with Zeller as an infinite series succeeding one another in time. It may be allowed at once that his disproof of the idea that the worlds are coexistent and eternal is decisive. To suppose that Anaximander regarded this or any other world as eternal, is a flat contradiction of everything we otherwise know, and of the Theophrastean tradition that he taught the world was perishable. We have, then, to decide between the view that, though all the worlds are perishable, there may be an unlimited number of them in existence at the same time, and the view that a new world never comes into existence till

[1] Arist. *de Caelo*, B, 13. 295 a 9. The identification of the eternal motion with the diurnal revolution is insisted on by Teichmüller and Tannery, and is the real source of the very unnatural interpretation which they give to the word *ἄπειρον*. It was obviously difficult to credit Anaximander with a belief in an infinite body which revolves in a circle. The whole theory rests upon a confusion between the finite spherical *κόσμος* within the *οὐρανός* and the infinite *περιέχον* outside it.

[2] [Plut.] *Strom.* fr. 2 (R. P. 21 b). The words *ἀνακυκλουμένων πάντων αὐτῶν* are most naturally to be interpreted as referring to an *ἀνακύκλησις* or cycle of *γένεσις* and *φθορά* in each of a multitude of coexistent worlds. It would be a very strange phrase to use of a succession of single worlds.

the old one has passed away. Now, Zeller allows[1] that there is nothing in the first of these views that is inconsistent with what we know of Anaximander; but he thinks all the statements which have come down to us point rather to the second. It seems to me that this is by no means the case, and, as the matter is of fundamental importance, it will be necessary to examine the evidence once more.

In the first place, the doxographical tradition proves that Theophrastos discussed the views of all the early philosophers as to whether there was one world or an infinite number, and there can be no doubt that, when he ascribed "innumerable worlds" to the Atomists, he meant coexistent and not successive worlds. Now, if he had really classed two such different views under one head, he would at least have been careful to point out in what respect they differed, and there is no trace of any such distinction in our tradition. On the contrary, Anaximander, Anaximenes, Archelaos, Xenophanes, Diogenes, Leukippos, Demokritos, and Epicurus are all mentioned together as holding the doctrine of "innumerable worlds" on all sides of this one,[2] and the only distinction drawn between their views is that, while Epicurus made the distances between these worlds unequal, Anaximander said all the worlds were equidistant.[3] Zeller rejected this evidence, which he

[1] Zeller, pp. 234 sqq.

[2] Aet. ii. 1, 3 (*Dox.* p. 327). Zeller is wrong in understanding *κατὰ πᾶσαν περιαγωγήν* here of the revolution of a cycle. It means simply "in every direction we turn," and so does the alternative reading *κατὰ πᾶσαν περίστασιν*. The six *περιστάσεις* are *πρόσω, ὀπίσω, ἄνω, κάτω, δεξιά, ἀριστερά* (Nicom. *Introd.* p. 85, 11, Hoche), and Polybios uses *περίστασις* of surrounding space.

[3] Aet. ii. 1, 8 (*Dox.* p. 329), *τῶν ἀπείρους ἀποφηναμένων τοὺς κόσμους Ἀναξίμανδρος τὸ ἴσον αὐτοὺς ἀπέχειν ἀλλήλων, Ἐπίκουρος ἄνισον εἶναι τὸ μεταξὺ τῶν κόσμων διάστημα.*

supposed to be merely that of Stobaios, on the ground that we can have no confidence in a writer who attributes "innumerable worlds" to Anaximenes, Archelaos, and Xenophanes. With regard to the first two, I hope to show that the statement is quite correct, and that it is not even incorrect in the case of the last.[1] In any case, it can be proved that the passage comes from Aetios,[2] and there is no reason for doubting that, in the last resort, it is derived from Theophrastos, though the name of Epicurus may have been added later. This is still further confirmed by what Simplicius says in his commentary on the *Physics*.[3]

Those who assumed innumerable worlds, *e.g.* Anaximander, Leukippos, Demokritos, and, at a later date, Epicurus, held that they came into being and passed away *ad infinitum*, some always coming into being and others passing away.

It is probable that this too comes from Theophrastos through Alexander. Simplicius does not invent such things.

We come lastly to a very important statement which Cicero has copied from Philodemos, the author of the Epicurean treatise on Religion found at Herculaneum, or perhaps from the immediate source of that work. "Anaximander's opinion was," he makes Velleius say, "that there were gods who came into being, rising and passing away at long intervals, and

[1] For Anaximenes, see § 30; Xenophanes, § 59; Archelaos, Chap. X.

[2] This is shown by the fact that the list of names is given also by Theodoret. See Appendix, § 10.

[3] Simpl. *Phys.* p. 1121, 5 (R. P. 21 b). Zeller says (p. 234, n. 4) that Simplicius elsewhere (*de Caelo*, p. 273 b 43) makes the same statement more doubtfully. But the words ὡς δοκεῖ, on which he relies, are hardly an expression of doubt, and refer, in any case, to the derivation of the doctrine of "innumerable worlds" from that of the ἄπειρον, not to the doctrine itself.

that these were the innumerable worlds";[1] and this must clearly be taken along with the statement of Aetios to the effect that, according to Anaximander, the "innumerable heavens" were gods.[2] Now it is very much more natural to understand the "long intervals" which Cicero mentions as intervals of space than as intervals of time;[3] and, if we take the passage in this way, we have a perfect agreement among all our authorities.

It may be added that it is very unnatural to understand the statement that the Boundless "encompasses all the worlds" of worlds succeeding one another in time; for on this view there is at a given time only one world to "encompass." Moreover, the argument mentioned by Aristotle that, if what is outside the heavens is infinite, body must be infinite, and there must be innumerable worlds, can only be understood in this sense, and is certainly intended to represent the reasoning of the Milesians; for they were the only cosmologists who held there was a boundless body outside the heavens.[4] Lastly, we happen to know that Petron, one of the earliest Pythagoreans, held there were just one hundred and eighty-three worlds arranged in a triangle,[5] which shows that views of this sort

[1] Cicero, *de Nat. D.* i. 25 (R. P. 21).

[2] Aet. i. 7, 12 (R. P. 21 a). The reading of Stob., *ἀπείρους οὐρανούς*, is guaranteed by the *ἀπείρους κόσμους* of Cyril, and the *ἀπείρους νοῦς* (*i.e.* *οὐνους*) of the pseudo-Galen. See *Dox.* p. 11.

[3] It is simplest to suppose that Cicero found *διαστήμασιν* in his Epicurean source, and that is a technical term for the *intermundia*.

[4] Arist. *Phys.* Γ, 4. 203 b 25, *ἀπείρου δ' ὄντος τοῦ ἔξω* (sc. *τοῦ οὐρανοῦ*), *καὶ σῶμα ἄπειρον εἶναι δοκεῖ καὶ κόσμοι* (sc. *ἄπειροι*). It is to be observed that the next words—*τί γὰρ μᾶλλον τοῦ κενοῦ ἐνταῦθα ἢ ἐνταῦθα*;—show clearly that this refers to the Atomists as well; but the *ἄπειρον σῶμα* will not apply to them. The suggestion is rather that both those who made the Boundless a body and those who made it a *κενόν* held the doctrine of *ἄπειροι κόσμοι* in the same sense.

[5] See below, § 53. Cf. Diels, *Elementum*, pp. 63 sqq.

existed long before the Atomists, and looks like an attempt to introduce some order into Anaximander's universe.

Origin of the heavenly bodies.

19. The doxographers have not left us in the dark as to the process by which the different parts of the world arose from the Boundless. The following statement comes ultimately from Theophrastos:—

He says that something capable of begetting hot and cold was separated off from the eternal at the origin of this world. From this arose a sphere of flame which grew round the air encircling the earth, as the bark grows round a tree. When this was torn off and enclosed in certain rings, the sun, moon, and stars came into existence.—Ps.-Plut. *Strom.* fr. 2 (R. P. 19).

We see from this that when a portion of the Boundless had been separated off from the rest to form a world, it first of all differentiated itself into the two opposites, hot and cold. The hot appears as a sphere of flame surrounding the cold; the cold, as earth with air surrounding it. We are not told, however, in this extract how the cold came to be differentiated into earth, air, and water; but there is a passage in Aristotle's *Meteorology* which throws some light on the subject. We read there:—

But those who are wiser in the wisdom of men give an origin for the sea. At first, they say, all the terrestrial region was moist; and, as it was dried up by the sun, the portion of it that evaporated produced the winds and the turnings of the sun and moon, while the portion left behind was the sea. So they think the sea is becoming smaller by being dried up, and that at last it will all be dry.—*Meteor.* B, 1. 353 b 5.

. . . .

And the same absurdity arises for those who say that the earth and the terrestrial part of the world at first were moist,

but that air arose from the heat of the sun, and that the whole world was thus increased, and that this is the cause of winds and the turnings of the heavens.[1]—*Ib.* 2. 355 a 21 (R. P. 20 a).

In his commentary on the passage, Alexander tells us that this was the view of Anaximander and Diogenes; and what he says is amply confirmed by Anaximander's theory of the sea as it is given by the doxographers (§ 20). We conclude, then, that after the first separation of the hot and the cold, the heat of the sphere of flame turned part of the moist, cold interior of the world into air or vapour—it is all one at this date—and that the expansion of this mist broke up the sphere of flame itself into rings. I give the theory which he adopted to explain the origin of the heavenly bodies from these rings as it has been preserved by Hippolytos, with some supplements from Aetios:—

The heavenly bodies are wheels of fire separated off from the fire which encircles the world, and enclosed in air. And they have breathing-holes, certain pipe-like passages at which the heavenly bodies are seen. For this reason, too, when the breathing-holes are stopped, eclipses occur. And the moon appears now to wax and now to wane because of the stopping and opening of the passages. The circle of the sun is twenty-seven times the size (of the earth, while that) of the moon is eighteen times as large.[2] The sun is highest of all, and lowest are the wheels of the fixed stars.—Hipp. *Ref.* i. 6 (R. P. 20).

[1] Zeller's difficulty about the meaning of *τροπαί* here (p. 223, n. 2) seems to be an imaginary one. The moon has certainly a movement in declination and, therefore, *τροπαί* (Dreyer, *Planetary Systems*, p. 17, n. 1).

[2] I assume with Diels (*Dox.* p. 560) that something has fallen out in our text of Hippolytos. I have, however, with Tannery, *Science hellène*, p. 91, supplied "eighteen times" rather than "nineteen times." Zeller (p. 224, n. 2) prefers the text of our MS. of Hippolytos to the testimony of Aetios.

Anaximander said the stars were hoop-like compressions of air, full of fire, breathing out flames at a certain point from orifices. The sun was highest of all, after it came the moon, and below these the fixed stars and the planets.—Aetios, ii. 13, 7; 15, 6 (R. P. 19 a).

Anaximander said the sun was a ring twenty-eight times the size of the earth, like a cart-wheel with the felloe hollow and full of fire, showing the fire at a certain point, as if through the nozzle of a pair of bellows.—Aet. ii. 20, 1 (R. P. 19 a).

Anaximander said the sun was equal to the earth, but the ring from which it breathes out and by which it is carried round was twenty-seven times as large as the earth.—Aet. ii. 21, 1 (*Dox.* p. 351).

Anaximander said the moon was a ring eighteen times the size of the earth. . . .—Aet. ii. 25, 1 (*Dox.* p. 355).[1]

Anaximander held that thunder and lightning were caused by the blast. When it is shut up in a thick cloud and bursts forth with violence, then the breakage of the cloud makes the noise, and the rift gives the appearance of a flash by contrast with the darkness of the cloud.—Aet. iii. 3, 1 (*Dox.* p. 367).

Anaximander held that wind was a current of air (*i.e.* vapour) which arose when its finest and moistest particles were set in motion or dissolved by the sun.—Aet. iii. 6, 1 (*Dox.* p. 374).

Rain was produced by the moisture drawn up from the earth by the sun.—Hipp. *Ref.* i. 6, 7 (*Dox.* p. 560).

We saw above that the sphere of flame was broken up into rings by the expansion of the air or vapour that its own heat had drawn up from the moist, cold interior. We must remember that Anaximander knew nothing of the ring of Saturn. There are three of these rings, that of the sun, that of the moon, and,

[1] Aetios goes on to say that the moon also is like a hollow cart-wheel full of fire with an ἐκπνοή. The difference in the figures of Hippolytos and Aetios is due to the fact that one refers to the internal and the other to the external circumferences of the rings. Cf. Tannery, *Science hellène*, p. 91; and Diels, "Ueber Anaximanders Kosmos" (*Arch.* x. pp. 231 sqq.).

lastly, nearest to the earth, the circle of the stars. The circle of the sun was twenty-seven times, and that of the moon eighteen times as large as the earth, from which we may perhaps infer that the circle of the stars was nine times as large. The numbers nine, eighteen, twenty-seven, play a considerable part in primitive cosmogonies.[1] We do not see the rings of fire as complete circles; for the mist that formed them encloses the fire, and becomes an outer ring of opaque vapour. These outer rings, however, have openings at one point of their circumference, through which the fire escapes, and these are the heavenly bodies we actually see.[2]

It will be observed that we only hear of three circles, and that the circle of the sun is the highest. The circle of the stars presents some difficulty. It is, in all probability, the Milky Way, the appearance of which may well have suggested the whole theory.[3] It seems that Anaximander must have thought it had more "breathing-holes" than one, though the tradition is silent on this point. There is not the slightest reason for supposing that he regarded it as a sphere. He could not have failed to see that a sphere so placed would make the sun and moon permanently invisible. What, then, are we to say of the fixed

[1] As Diels points out (*Arch.* x. p. 229) the explanation given by Gomperz, p. 53, cannot be right. It implies the fifth century theory of μύδροι. Anaximander knew nothing of the "great mass" of the sun.

[2] The true meaning of this doctrine was first explained by Diels (*Dox.* pp. 25 sqq.). The flames rush forth *per magni circum spiracula mundi*, as Lucretius has it (vi. 493). The πρηστῆρος αὐλός, to which these are compared, is simply the nozzle of a pair of bellows, a sense which the word πρηστήρ has in Apollonios Rhodios (iv. 776), and has nothing to do with the meteorological phenomenon of the same name, for which see Chap. III. § 71. It is not now necessary to refute the earlier interpretations.

[3] It cannot be the Zodiac; for the planets were not separately studied yet.

stars that do not lie in the Milky Way? There seems to be no way of accounting for them unless we assume that they are the "innumerable worlds" which we have just discussed. As the fire and air which surrounded the world have been broken up into rings, we must be able to see right out into the Boundless, and the fixed stars must be just the worlds, each surrounded by its fiery envelope. It does not seem possible to explain all we are told in any other way; and, if this is right, the statement of some authors, that Anaximander regarded the stars of heaven as gods, may be more than the mere mistake which it is now generally taken to be.[1]

The explanation given of thunder and lightning was very similar. They too were caused by fire breaking through compressed air, that is to say, through the storm-clouds. It seems probable that this is really the origin of the theory, and that Anaximander explained the heavenly bodies on the analogy of lightning, not *vice versa*. That would be in perfect agreement with the meteorological interest of the time.

Earth and sea.

20. We turn now to what we are told of the origin of earth and sea from the moist, cold matter which was "separated off" in the beginning, and which filled the inside of the sphere of flame:—

The sea is what is left of the original moisture. The fire has dried up most of it and turned the rest salt by scorching it.—Aet. iii. 16, 1 (R. P. 20 a).

He says that the earth is cylindrical in form, and that its

[1] The *Placita* and Eusebios both have τοὺς ἀστέρας οὐρανίους instead of τοὺς ἀπείρους οὐρανούς (see above, p. 65, n. 2), and it seems just possible that this is not a mere corruption of the text. The common source may have had both statements. I do not, however, rest the interpretation given above on this very insecure basis. Quite apart from it, it seems to be the only way out of the difficulty.

depth is as a third part of its breadth.—Ps.-Plut. *Strom.* fr. 2 (R. P. *ib.*).

The earth swings free, held in its place by nothing. It stays where it is because of its equal distance from everything. Its shape is convex and round, and like a stone pillar. We are on one of the surfaces, and the other is on the opposite side.[1]—Hipp. *Ref.* i. 6 (R. P. 20).

Adopting for a moment the later theory of "elements," we see that Anaximander put fire on one side as "the hot," and all the rest on the other as "the cold," which is also moist. This may explain how Aristotle came to speak of the Boundless as intermediate between fire and water. And we have seen also that the moist element was partly turned into "air" or vapour by the fire, which explains how he could say the Boundless was something between fire and air, or between air and water.[2]

The moist, cold interior of the world is not, it will be noticed, pure water. It is always called "the moist" or "the moist state." That is because it has to be still further differentiated under the influence of heat into earth, water, and vapour. The gradual drying up of the water by the fire is a good example of what Anaximander meant by "injustice." And we see how this injustice brings about the destruction of the world.

[1] The MSS. of Hippolytos have *ὑγρὸν στρογγύλον*. Roeper read *γυρὸν* [*στρογγύλον*], supposing the second word to be a gloss on the first; but Diels has shown (*Dox.* p. 218) that both are wanted. The first means "convex," and applies to the *surface* of the earth; while the second means "round," and refers to its circuit. As to *κίονι λίθῳ*, it is not easy to say anything positive. It might, possibly, be a mere corruption of *κυλίνδρῳ* (cf. Plut. *Strom.* fr. 2; R. P. 20 a); but, if so, it is a very old one. Aetios (iii. 10, 2), who is quite independent of Hippolytos, has *λίθῳ κίονι*; Roeper suggested *κιονέῃ λίθῳ*; Teichmüller, *κίονος λίθῳ*; while Diels doubtfully puts forward *λιθῷ κίονι*, which he suggests might be a Theophrastean modernisation of an original *λιθέῃ κίονι* (*Dox.* p. 219).

[2] See above, p. 58, n. 1.

The fire will in time dry up and burn up the whole of the cold, moist element. But then it will not be fire any longer; it will simply be the "mixture," if we choose to call it so, of the hot and cold—that is, it will be the same as the Boundless which surrounds it, and will pass away into it.

The view which Anaximander takes of the earth is a great advance upon anything we can reasonably attribute to Thales, and Aristotle has preserved the arguments by which he supported it. It is equally distant from the extremes in every direction, and there is no reason for it to move up or down or sideways.[1] Still, he does not attain to the idea that it is spherical. He believes that we live on a convex disc, and from this the cylindrical form follows as a matter of course. The really remarkable thing is that he should have seen, however dimly, that there is no absolute up and down in the world.

Animals. 21. We have seen enough to show us that the speculations of Anaximander about the world were of an extremely daring character; we come now to the crowning audacity of all, his theory of the origin of living creatures. The Theophrastean account of this has been well preserved by the doxographers:—

Living creatures arose from the moist element as it was evaporated by the sun. Man was like another animal, namely, a fish, in the beginning.—Hipp. *Ref.* i. 6 (R. P. 22 a).

The first animals were produced in the moisture, each enclosed in a prickly bark. As they advanced in age, they came

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[1] Arist. *de Caelo*, B, 13. 295 b 10, *εἰσὶ δέ τινες οἳ διὰ τὴν ὁμοιότητά φασιν αὐτὴν (τὴν γῆν) μένειν, ὥσπερ τῶν ἀρχαίων Ἀναξίμανδρος· μᾶλλον μὲν γὰρ οὐθὲν ἄνω ἢ κάτω ἢ εἰς τὰ πλάγια φέρεσθαι προσήκειν τὸ ἐπὶ τοῦ μέσου ἱδρυμένον καὶ ὁμοίως πρὸς τὰ ἔσχατα ἔχον.* That Aristotle is really reproducing Anaximander seems to be shown by the use of *ὁμοιότης* in the old sense of "equality."

out upon the drier part. When the bark broke off,[1] they survived for a short time.—Aet. v. 19, 1 (R. P. 22).

Further, he says that originally man was born from animals of another species. His reason is that while other animals quickly find food by themselves, man alone requires a lengthy period of suckling. Hence, had he been originally as he is now, he would never have survived.—Ps.-Plut. *Strom.* fr. 2 (R. P. *ib.*).

He declares that at first human beings arose in the inside of fishes, and after having been reared like sharks,[2] and become capable of protecting themselves, they were finally cast ashore and took to land.—Plut. *Symp. Quaest.* 730 f (R. P. *ib.*).

The importance of these statements has sometimes been overrated and still more often underestimated. Anaximander has been called a precursor of Darwin by some, while others have treated the whole thing as a mythological survival. It is therefore important to notice that this is one of the rare cases where we have not merely a *placitum*, but an indication, meagre though it be, of the observations on which it was based, and the line of argument by which it was supported. It is clear from this that Anaximander had an idea of what is meant by adaptation to environment and survival of the fittest, and that he saw the higher mammals could not represent the original type of animal. For this he looked to the sea, and he naturally fixed upon those fishes which present the closest analogy to the *mammalia*. The statements of Aristotle

[1] This is to be understood in the light of what we are told about γαλεοί below. Cf. Arist. *Hist. An.* Z, 10. 565 a 25, τοῖς μὲν οὖν σκυλίοις, οὓς καλοῦσί τινες νεβρίας γαλεούς, ὅταν περιρραγῇ καὶ ἐκπέσῃ τὸ ὄστρακον, γίνονται οἱ νεοττοί.

[2] Reading ὥσπερ οἱ γαλεοί for ὥσπερ οἱ παλαιοί with Doehner, who compares Plut. *de soll. anim.* 982 a, where the φιλόστοργον of the shark is described. See p. 74, n. 1.

about the *galeus levis* were shown long ago by Johannes Müller to be more accurate than those of later naturalists, and we now know that these observations were already made by Anaximander. The manner in which the shark nourishes its young furnished him with the very thing he required to explain the survival of the earliest animals.[1]

Theology. 22. In the course of our discussion of the "innumerable worlds" we saw that Anaximander regarded these as gods. It is true, of course, as Zeller says,[2] that to the Greeks the word *θεός* meant primarily an object of worship, and he rightly adds that no one would think of worshipping innumerable worlds. This, however, is no real objection to our interpretation, though it serves to bring out an interesting point in the development of Greek theological ideas. The philosophers, in fact, departed altogether from the received usage of the word *θεός*. Empedokles called the Sphere and the Elements gods, though it is not to be supposed that he regarded them as objects of worship, and in the same

[1] On Aristotle and the *galeus levis*, see Johannes Müller, "Ueber den glatten Hai des Aristoteles" (*K. Preuss. Akad.*, 1842), to which my attention has been directed by my colleague, Prof. D'Arcy Thomson. The precise point of the words *τρεφόμενοι ὥσπερ οἱ γαλεοί* appears from Arist. *Hist. An.* Z, 10. 565 b 1, *οἱ δὲ καλούμενοι λεῖοι τῶν γαλεῶν τὰ μὲν ᾠὰ ἴσχουσι μεταξὺ τῶν ὑστερῶν ὁμοίως τοῖς σκυλίοις, περιστάντα δὲ ταῦτα εἰς ἑκατέραν τὴν δικρόαν τῆς ὑστέρας καταβαίνει, καὶ τὰ ζῷα γίνεται τὸν ὀμφαλὸν ἔχοντα πρὸς τῇ ὑστέρᾳ, ὥστε ἀναλισκομένων τῶν ᾠῶν ὁμοίως δοκεῖν ἔχειν τὸ ἔμβρυον τοῖς τετράποσιν.* It is not necessary to suppose that Anaximander referred to the further phenomenon described by Aristotle, who more than once says that all the *γαλεοί* except the *ἀκανθίας* "send out their young and take them back again" (*ἐξαφιᾶσι καὶ δέχονται εἰς ἑαυτοὺς τοὺς νεοττούς*, *ib.* 565 b 23), for which compare also Ael. i. 17; Plut. *de soll. anim.* 982 a. The *placenta* and umbilical cord described by Johannes Müller will account sufficiently for all he says. At the same time, I understand that deep-sea fishermen at the present day confirm this remarkable statement also, and two credible witnesses have informed me that they believe they have seen the thing happen with their own eyes.

[2] Zeller, p. 230.

way we shall find that Diogenes of Apollonia spoke of Air as a god.[1] As we may learn from the *Clouds* of Aristophanes, it was just this way of speaking that got philosophers the name of being ἄθεοι. It is of great importance to bear this point in mind; for, when we come to Xenophanes, we shall see that the god or gods he spoke of meant just the world or worlds. It seems also that Anaximander called the Boundless itself divine,[2] which is quite in accordance with the language of Empedokles and Diogenes referred to above.

III. Anaximenes

23. Anaximenes of Miletos, son of Eurystratos, was, according to Theophratos, an "associate" of Anaximander.[3] Apollodoros said, it appears, that he "flourished" about the time of the fall of Sardeis (546/5 B.C.), and died in Ol. LXIII. (528/524 B.C.).[4] In other words, he was born when Thales "flourished," and "flourished" when Thales died, and this means that Apollodoros had no definite information about his date at all. He most probably made him die in the sixty-third Olympiad because that gives just a hundred years, or three generations, for the Milesian school from the birth of Thales.[5] We cannot, therefore, say any- Life.

[1] For Empedokles, see Chap. V. § 119; and for Diogenes, Chap. X. § 188, fr. 5. The cosmologists followed the theogonists and cosmogonists in this. No one worshipped Okeanos and Tethys, or even Ouranos.

[2] Arist. *Phys.* Γ, 4. 203 b 13 (R. P. 17).

[3] Theophr. *Phys. Op.* fr. 2 (R. P. 26).

[4] This follows from a comparison of Diog. ii. 3 with Hipp. *Ref.* i. 7 (R. P. 23). In the latter passage we must, however, read τρίτον for πρῶτον with Diels. The suggestion in R. P. 23 e that Apollodoros mentioned the Olympiad without giving the number of the year is inadequate; for Apollodoros did not reckon by Olympiads, but Athenian archons.

[5] Jacoby (p. 194) brings the date of his death into connexion with the *floruit* of Pythagoras, which seems to me less probable. Lortzing (*Jahresber.*, 1898, p. 202) objects to my view on the ground that the period of a hundred

thing positive as to his date, except that he must have been younger than Anaximander, and must have flourished before 494 B.C., when the school was, of course, broken up by the destruction of Miletos.

His book.

24. Anaximenes wrote a book which certainly survived until the age of literary criticism; for we are told that he used a simple and unpretentious Ionic,[1] very different, we may suppose, from the poetical prose of Anaximander.[2] We may probably trust this criticism, which comes ultimately from Theophrastos; and it furnishes a good illustration of the truth that the character of a man's thoughts is sure to find expression in his style. We have seen that the speculations of Anaximander were distinguished for their hardihood and breadth; those of Anaximenes are marked by just the opposite quality. He appears to have thought out his system carefully, but he rejects the more audacious theories of his predecessor. The result is that, while his view of the world is on the whole much less like the truth than Anaximander's, it is more fruitful in ideas that were destined to hold their ground.

Theory of the primary substance.

25. Anaximenes is one of the philosophers on whom Theophrastos wrote a special monograph;[3] and this gives us an additional guarantee for the trustworthiness of the tradition derived from his great work. The following[4] are the passages which seem to contain the fullest and most accurate account of what he had to say on the central feature of the system:—

years plays no part in Apollodoros's calculations. It will be seen, however, from Jacoby, pp. 39 sqq., that there is some reason for believing he made use of the generation of 33⅓ years.

[1] Diog. ii. 3 (R. P. 23).

[2] Cf. the statement of Theophrastos above, § 13.

[3] On these monographs see *Dox.* p. 103.

[4] See the conspectus of extracts from Theophrastos given in *Dox.* p. 135.

Anaximenes of Miletos, son of Eurystratos, who had been an associate of Anaximander, said, like him, that the underlying substance was one and infinite. He did not, however, say it was indeterminate, like Anaximander, but determinate; for he said it was Air.—*Phys. Op.* fr. 2 (R. P. 26).

From it, he said, the things that are, and have been, and shall be, the gods and things divine, took their rise, while other things come from its offspring.—Hipp. *Ref.* i. 7 (R. P. 28).

"Just as," he said, "our soul, being air, holds us together, so do breath and air encompass the whole world."—Aet. i. 3, 4 (R. P. 24).

And the form of the air is as follows. Where it is most even, it is invisible to our sight; but cold and heat, moisture and motion, make it visible. It is always in motion; for, if it were not, it would not change so much as it does.—Hipp. *Ref.* i. 7 (R. P. 28).

It differs in different substances in virtue of its rarefaction and condensation.—*Phys. Op.* fr. 2 (R. P. 26).

When it is dilated so as to be rarer, it becomes fire; while winds, on the other hand, are condensed Air. Cloud is formed from Air by felting;[1] and this, still further condensed, becomes water. Water, condensed still more, turns to earth; and when condensed as much as it can be, to stones.—Hipp. *Ref.* i. 7 (R. P. 28).[2]

Rarefaction and condensation.

26. At the first glance, this undoubtedly looks like a falling off from the more refined doctrine of Anaximander to a cruder view; but a moment's reflexion will show that this is not altogether the case. On the contrary, the introduction of rarefaction and condensation into the theory is a notable advance.[3] In fact, it

[1] "Felting" (πίλησις) is the regular term for this process with all the early cosmologists, from whom Plato has taken it (*Tim.* 58 b 4; 76 c 3).

[2] A more condensed form of the same doxographical tradition is given by Ps.-Plut. *Strom.* fr. 3 (R. P. 25).

[3] Simplicius, *Phys.* p. 149, 32 (R. P. 26 b), says, according to the MSS., that Theophrastos spoke of rarefaction and condensation in the case of Anaximenes *alone*. We must either suppose with Zeller (p. 193, n. 2) that

makes the Milesian cosmology thoroughly consistent for the first time; since it is clear that a theory which explains everything by the transformations of a single substance is bound to regard all differences as purely quantitative. The infinite substance of Anaximander, from which the opposites "in it" are "separated out," cannot, strictly speaking, be thought of as homogeneous, and the only way to save the unity of the primary substance is to say that all diversities are due to the presence of more or less of it in a given space. And when once this important step has been taken, it is no longer necessary to make the primary substance something "distinct from the elements," to use Aristotle's inaccurate but convenient phrase; it may just as well be one of them.

Air. 27. The air that Anaximenes speaks of includes a good deal that we should not call by that name. In its normal condition, when most evenly distributed, it is invisible, and it then corresponds to our "air"; it is identical with the breath we inhale and the wind that blows. That is why he called it *πνεῦμα*. On the other hand, the old idea, familiar to us in Homer, that mist or vapour is condensed air, is still accepted without question. In other words, we may say that Anaximenes supposed it to be a good deal easier to get liquid air than it has since proved to be. It was Empedokles, we shall see, who first discovered that what we call air was a distinct corporeal substance, and was not identical either with vapour or with empty space. In the earlier cosmologists "air" is always a form of vapour, and

this means "alone among the oldest Ionians" or read *πρώτου* for *μόνου* with Usener. The regular terms are *πύκνωσις* and *ἀραίωσις* or *μάνωσις*. Plutarch, *de prim. frig.* 947 f (R. P. 27), says that Anaximenes used the term *τὸ χαλαρόν* for the rarefied air.

even darkness is a form of it. It was Empedokles who cleared up this point too by showing that darkness is a shadow.[1]

It was natural for Anaximenes to fix upon Air in this sense as the primary substance; for, in the system of Anaximander, it occupied an intermediate place between the two fundamental opposites, the sphere of flame and the cold, moist mass within it (§ 19). We know from Plutarch that he fancied air became warmer when rarefied, and colder when condensed. Of this he satisfied himself by a curious experimental proof. When we breathe with our mouths open, the air is warm; when we breathe with our lips closed, it is cold.[2]

28. This argument from human breathing brings us to an important point in the theory of Anaximenes, which is attested by the single fragment that has come down to us.[3] "Just as our soul, being air, holds us together, so do breath and air encompass the whole world." The primary substance bears the same relation to the life of the world as to that of man. Now this, we shall see, was the Pythagorean view;[4] and it is also an early instance of the argument from the microcosm to the macrocosm, and so marks the first beginnings of an interest in physiological matters. The world breathes.

[1] For the meaning of ἀήρ in Homer, see Schmidt, *Synonomik*, § 35; and for its survival in Ionic prose, Hippokrates, *Περὶ ἀέρων, ὑδάτων, τόπων*, 15, *ἀήρ τε πολὺς κατέχει τὴν χώρην ἀπὸ τῶν ὑδάτων*. Plato is still conscious of the old meaning of the word; for he makes Timaios say *ἀέρος (γένη) τὸ μὲν εὐαγέστατον ἐπίκλην αἰθὴρ καλούμενος, ὁ δὲ θολερώτατος ὁμίχλη καὶ σκότος* (*Tim.* 58 d). The view given in the text has been criticised by Tannery, "Une nouvelle hypothèse sur Anaximandre" (*Arch.* viii. pp. 443 sqq.), and I have slightly altered my expression of it to meet these criticisms. The point is of fundamental importance, as we shall see, for the interpretation of Pythagoreanism.

[2] Plut. *de prim. frig.* 947 f (R. P. 27).

[3] Aet. i. 3, 4 (R. P. 24).

[4] See Chap. II. § 53.

The parts of the world.

29. We turn now to the doxographical tradition concerning the formation of the world and its parts:—

He says that, as the air was felted, the earth first came into being. It is very broad and is accordingly supported by the air.—Ps.-Plut. *Strom.* fr. 3 (R. P. 25).

In the same way the sun and the moon and the other heavenly bodies, which are of a fiery nature, are supported by the air because of their breadth. The heavenly bodies were produced from the earth by moisture rising from it. When this is rarefied, fire comes into being, and the stars are composed of the fire thus raised aloft. There were also bodies of earthy substance in the region of the stars, revolving along with them. And he says that the heavenly bodies do not move under the earth, as others suppose, but round it, as a cap turns round our head. The sun is hidden from sight, not because it goes under the earth, but because it is concealed by the higher parts of the earth, and because its distance from us becomes greater. The stars give no heat because of the greatness of their distance.—Hipp. *Ref.* i. 7, 4-6 (R. P. 28).

Winds are produced when air is condensed and rushes along under propulsion; but when it is concentrated and thickened still more, clouds are generated; and, lastly, it turns to water.[1]—Hipp. *Ref.* i. 7, 7 (*Dox.* p 561).

The stars are fixed like nails in the crystalline vault of the heavens.—Aet. ii. 14, 3 (*Dox.* p. 344).

They do not go under the earth, but turn round it.—*Ib.* 16, 6 (*Dox.* p. 346).

The sun is fiery.—*Ib.* 20, 2 (*Dox.* p. 348).

It is broad like a leaf.—*Ib.* 22, 1 (*Dox.* p. 352).

The heavenly bodies are diverted from their courses by the resistance of compressed air.—*Ib.* 23, 1 (*Dox.* p. 352).

The moon is of fire.—*Ib.* 25, 2 (*Dox.* p. 356).

Anaximenes explained lightning like Anaximander, adding as an illustration what happens in the case of the sea, which flashes when divided by the oars.—*Ib.* iii. 3, 2 (*Dox.* p. 368).

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[1] The text is very corrupt here. I retain ἐκπεπυκνωμένος, because we are told above that winds are condensed air, and I adopt Zeller's ἀραιῷ εἰσφέρηται (p. 246, n. 1).

Hail is produced when water freezes in falling; snow, when there is some air imprisoned in the water.—Aet. iii. 4, 1 (*Dox.* p. 370).

The rainbow is produced when the beams of the sun fall on thick condensed air. Hence the anterior part of it seems red, being burnt by the sun's rays, while the other part is dark, owing to the predominance of moisture. And he says that a rainbow is produced at night by the moon, but not often, because there is not constantly a full moon, and because the moon's light is weaker than that of the sun.—*Schol. Arat.*[1] (*Dox.* p. 231).

The earth was like a table in shape.—Aet. iii. 10, 3 (*Dox.* p. 377).

The cause of earthquakes was the dryness and moisture of the earth, occasioned by droughts and heavy rains respectively. —*Ib.* 15, 3 (*Dox.* p. 379).

We have seen that Anaximenes was quite justified in going back to Thales in regard to his general theory of the primary substance; but it cannot be denied that the effect of this upon the details of his cosmology was unfortunate. The earth is once more imagined as a table-like disc floating upon the air. The sun, moon, and planets are also fiery discs which float on the air "like leaves." It follows that the heavenly bodies cannot be thought of as going under the earth at night, but only as going round it laterally like a cap or a millstone.[2] This curious view is also mentioned in Aristotle's *Meteorology*,[3] where the elevation of the northern parts of the earth, which makes it possible for

[1] The source of this is Poseidonios, who used Theophrastos. *Dox.* p. 231.

[2] Theodoret (iv. 16) speaks of those who believe in a revolution like that of a millstone, as contrasted with one like that of a wheel. Diels (*Dox.* p. 46) refers these similes to Anaximenes and Anaximander respectively. They come, of course, from Aetios (Appendix, § 10), though they are given neither by Stobaios nor in the *Placita*.

[3] B, 1. 354 a 28 (R. P. 28 c).

the heavenly bodies to be hidden from sight, is referred to. In fact, whereas Anaximander had regarded the orbits of the sun, moon, and stars as oblique with reference to the earth, Anaximenes regarded the earth itself as inclined. The only real advance is the distinction of the planets, which float freely in the air, from the fixed stars, which are fastened to the "crystalline" vault of the sky.[1]

The earthy bodies, which circulate among the planets, are doubtless intended to account for eclipses and the phases of the moon.[2]

Innumerable worlds.

30. As might be expected, there is the same difficulty about the "innumerable worlds" ascribed to Anaximenes as about those of Anaximander, and most of the arguments given above (§ 18) apply here also. The evidence, however, is far less satisfactory. Cicero says that Anaximenes regarded air as a god, and adds that it came into being.[3] That there is some confusion here is obvious. Air, as the primary substance, is certainly eternal, and it is quite likely that Anaximenes called it "divine," as Anaximander did the Boundless; but it is certain that he also spoke of gods who came into being and passed away. These arose, he said, from the air. This is expressly stated by Hippolytos,[4] and also by St. Augustine.[5] These gods are probably to

[1] We do not know how Anaximenes imagined the "crystalline" sky. It is probable that he used the word πάγος as Empedokles did. Cf. Chap. V. § 112.

[2] See Tannery, *Science hellène*, p. 153. For the precisely similar bodies assumed by Anaxagoras, see below, Chap. VI. § 135. See further Chap. VII. § 151.

[3] Cic. *de nat. D.* i. 26 (R. P. 28 b). On what follows see Krische, *Forschungen*, pp. 52 sqq.

[4] Hipp. *Ref.* i. 7, 1 (R. P. 28).

[5] Aug. *de civ. D.* viii. 2: "Anaximenes omnes rerum causas infinito aëri dedit: nec deos negavit aut tacuit; non tamen ab ipsis aërem factum, sed ipsos ex aëre ortos credidit" (R. P. 28 b).

be explained like Anaximander's. Simplicius, indeed, takes another view;[1] but he may have been misled by a Stoic authority.

31. It is not quite easy for us to realise that, in the eyes of his contemporaries, and for long after, Anaximenes was a much more important figure than Anaximander. And yet the fact is certain. We shall see that Pythagoras, though he followed Anaximander in his account of the heavenly bodies, was far more indebted to Anaximenes for his general theory of reality (§ 53). We shall see further that when, at a later date, science revived once more in Ionia, it was "the philosophy of Anaximenes" to which it attached itself (§ 122). Anaxagoras adopted many of his most characteristic views (§ 135), and some of them even found their way into the cosmology of the Atomists.[2] Diogenes of Apollonia went back to the central doctrine of Anaximenes, and once more made Air the primary substance, though he also tried to combine it with the theories of Anaxagoras (§ 188). We shall come to all this later on; but it seemed desirable to point out at once that Anaximenes marks the culminating point of the line of thought which

Influence of Anaximenes.

[1] Simpl. *Phys.* p. 1121, 12 (R. P. 28 a). The passage from the *Placita* is of higher authority than this from Simplicius. Note, further, that it is only to Anaximenes, Herakleitos, and Diogenes that successive worlds are ascribed even here. With regard to Anaximander, Simplicius is quite clear. For the Stoic view of Herakleitos, see Chap. III. § 78; and for Diogenes, Chap. X. § 188. That Simplicius is following a Stoic authority is suggested by the words *καὶ ὕστερον οἱ ἀπὸ τῆς Στοᾶς*. Cf. also Simpl. *de Caelo*, p. 202, 13.

[2] In particular, the authority of Anaximenes was so great that both Leukippos and Demokritos adhered to his theory of a disc-like earth. Cf. Aet. iii. 10, 3-5 (Περὶ σχήματος γῆς), Ἀναξιμένης τραπεζοειδῆ (τὴν γῆν). Λεύκιππος τυμπανοειδῆ. Δημόκριτος δισκοειδῆ μὲν τῷ πλάτει, κοίλην δὲ τῷ μέσῳ. This, in spite of the fact that the spherical form of the earth was already a commonplace in circles affected by Pythagoreanism.

started with Thales, and to show how the "philosophy of Anaximenes" came to mean the Milesian doctrine as a whole. This it can only have done because it was really the work of a school, of which Anaximenes was the last distinguished representative, and because his contribution to it was one that completed the system he had inherited from his predecessors. That the theory of rarefaction and condensation was really such a completion of the Milesian system, we have seen already (§ 26), and it need only be added that a clear realisation of this fact will be the best clue at once to the understanding of the Milesian cosmology itself and to that of the systems which followed it. In the main, it is from Anaximenes that they all start.

CHAPTER II

SCIENCE AND RELIGION

32. So far we have not met with any trace of direct antagonism between science and popular beliefs, though the views of the Milesian cosmologists were really as inconsistent with the religions of the people as with the mythology of the anthropomorphic poets.[1] Two things hastened the conflict—the shifting of the scene to the West, and the religious revival which swept over Hellas in the sixth century B.C.

Migrations to the West.

The chief figures in the philosophical history of the period were Pythagoras of Samos and Xenophanes of Kolophon. Both were Ionians by birth, and yet both spent the greater part of their lives in the West. We see from Herodotos how the Persian advance in Asia Minor occasioned a series of migrations to Sicily and Southern Italy;[2] and this, of course, made a great difference to philosophy as well as to religion. The new views had probably grown up so naturally and gradually in Ionia that the shock of conflict and reaction was avoided; but that could no longer be so, when they were transplanted to a region where men were wholly unprepared to receive them.

[1] For the theological views of Anaximander and Anaximenes, see §§ 22 and 30.

[2] Cf. Herod. i. 170 (advice of Bias); vi. 22 sqq. (Kale Akte).

Another, though a somewhat later, effect of these migrations was to bring Science into contact with Rhetoric, one of the most characteristic products of Western Hellas. Already in Parmenides we may note the presence of that dialectical and controversial spirit which was destined to have so great an influence on Greek thought, and it was just this fusion of the art of arguing for victory with the search for truth that before long gave birth to Logic.

The religious revival.

33. Most important of all in its influence on philosophy was the religious revival which culminated about this time. The religion of continental Hellas had developed in a very different way from that of Ionia. In particular, the worship of Dionysos, which came from Thrace, and is barely mentioned in Homer, contained in germ a wholly new way of looking at man's relation to the world. It would certainly be wrong to credit the Thracians themselves with any very exalted views; but there can be no doubt that, to the Greeks, the phenomenon of ecstasy suggested that the soul was something more than a feeble double of the self, and that it was only when "out of the body" it could show its true nature.[1] To a less extent, such ideas were also suggested by the worship of Demeter, whose mysteries were celebrated at Eleusis; though, in later days, these came to take the leading place in men's minds. That was because they were incorporated in the public religion of Athens.

Before the time with which we are dealing, tradition shows us dimly an age of inspired prophets—Bakides

[1] On all this, see Rohde, *Psyche*, pp. 327 sqq. It is probable that he exaggerated the degree to which these ideas were already developed among the Thracians, but the essential connexion of the new view of the soul with Northern worships is confirmed by the tradition over and over again.

and Sibyls—followed by one of strange medicine-men like Abaris and Aristeas of Prokonnesos. With Epimenides of Crete, we touch the fringe of history, while Pherekydes of Syros is the contemporary of the early cosmologists, and we still have some fragments of his discourse. It looked as if Greek religion were about to enter upon the same stage as that already reached by the religions of the East; and, but for the rise of science, it is hard to see what could have checked this tendency. It is usual to say that the Greeks were saved from a religion of the Oriental type by their having no priesthood; but this is to mistake the effect for the cause. Priesthoods do not make dogmas, though they preserve them once they are made; and in the earlier stages of their development, the Oriental peoples had no priesthoods either in the sense intended.[1] It was not so much the absence of a priesthood as the existence of the scientific schools that saved Greece.

34. The new religion—for in one sense it was new, though in another as old as mankind—reached its highest point of development with the foundation of the Orphic communities. So far as we can see, the original home of these was Attika; but they spread with extraordinary rapidity, especially in Southern Italy and Sicily.[2] They were first of all associations for the worship of Dionysos; but they were distinguished by two features which were new among the Hellenes. They looked to a revelation as the source

The Orphic religion.

[1] See Meyer, *Gesch. des Alterth.* ii. § 461. The exaggerated rôle often attributed to priesthoods is a survival of French eighteenth century thinking.

[2] See E. Meyer, *Gesch. des Alterth.* ii. §§ 453-460, who rightly emphasises the fact that the Orphic theogony is the continuation of Hesiod's work. As we have seen, some of it is even older than Hesiod.

of religious authority, and they were organised as artificial communities. The poems which contained their theology were ascribed to the Thracian Orpheus, who had himself descended into Hades, and was therefore a safe guide through the perils which beset the disembodied soul in the next world. We have considerable remains of this literature, but they are mostly of late date, and cannot safely be used as evidence for the beliefs of the sixth century. We do know, however, that the leading ideas of Orphicism were quite early. A number of thin gold plates with Orphic verses inscribed on them have been discovered in Southern Italy;[1] and though these are somewhat later in date than the period with which we are dealing, they belong to the time when Orphicism was a living creed and not a fantastic revival. What can be made out from them as to the doctrine has a startling resemblance to the beliefs which were prevalent in India about the same time, though it seems impossible that there should have been any actual contact between India and Greece at this date. The main purpose of the *Orgia*[2] was to "purify" the believer's soul, and so enable it to escape from the "wheel of birth," and it was for the better attainment of this end that the Orphics were organised in communities. Religious associations must have been known to the Greeks from a fairly early date;[3] but the oldest of

[1] For the gold plates of Thourioi and Petelia, see the Appendix to Miss Harrison's *Prolegomena to the Study of Greek Religion*, where the text of them is discussed and a translation given by Professor Gilbert Murray.

[2] This was the oldest name for these "mysteries," and it simply means "sacraments" (cf. ἔοργα). *Orgia* are not necessarily "orgiastic." That association of ideas merely comes from the fact that they belonged to the worship of Dionysos.

[3] Herodotos mentions that Isagoras and those of his γένος worshipped

these were based, at least in theory, on the tie of kindred blood. What was new was the institution of communities to which any one might be admitted by initiation.[1] This was, in fact, the establishment of churches, though there is no evidence that these were connected with each other in such a way that we could rightly speak of them as a single church. The Pythagoreans came nearer to realising that.

35. We have to take account of the religious revival here, chiefly because it suggested the view that philosophy was above all a "way of life." Science too was a "purification," a means of escape from the "wheel." This is the view expressed so strongly in Plato's *Phaedo*, which was written under the influence of Pythagorean ideas.[2] Sokrates became to his followers the ideal "wise man," and it was to this side of his personality the Cynics mainly attached themselves. From them proceeded the Stoic sage and the Christian saint, and also the whole brood of impostors whom Lucian has pilloried for our edification.[3] Saints and sages are apt to appear in questionable shapes, and

Philosophy as a Way of Life.

the Karian Zeus (v. 66), and it is probable that the *Orgeones* attached by Kleisthenes to the Attic *phratriai* were associations of this kind. See Foucart, *Les associations religieuses chez les Grecs*.

[1] A striking parallel is afforded to all this by what we are told in Robertson Smith's *Religion of the Semites*, p. 339. "The leading feature that distinguished them" (the Semitic mysteries of the seventh century B.C.) "from the old public cults with which they came into competition, is that they were not based on the principle of nationality, but sought recruits from men of every race who were willing to accept initiation through the mystic sacraments."

[2] The *Phaedo* is dedicated, as it were, to Echekrates and the Pythagorean society at Phleious, and it is evident that Plato in his youth was impressed by the religious side of Pythagoreanism, though the influence of Pythagorean science is not clearly marked till a later period. Note specially the ἄτραπος of *Phd.* 66 b 4. In *Rep.* x. 600 b 1, Plato speaks of Pythagoras as the originator of a private ὁδός τις βίου.

[3] Cf. especially the point of view of the *Auction of Lives* (Βίων πρᾶσις).

Apollonios of Tyana showed in the end where this view may lead. It was not wholly absent from any Greek philosophy after the days of Pythagoras. Aristotle is as much possessed by it as any one, as we may see from the Tenth Book of the *Ethics*, and as we should see still more distinctly if we possessed such works as the *Protreptikos* in their entirety.[1] Plato, indeed, tried to make the ideal wise man of service to the state and mankind by his doctrine of the philosopher king. It was he alone, so far as we know, that insisted on philosophers descending by turns into the cave from which they had been released and coming to the help of their former fellow-prisoners.[2] That was not, however, the view that prevailed, and the "wise man" became more and more detached from the world. Apollonios of Tyana was quite entitled to regard himself as the spiritual heir of Pythagoras; for the theurgy and thaumaturgy of the late Greek schools was but the fruit of the seed sown in the generation before the Persian Wars.

No doctrine in the "Mysteries."

36. On the other hand, it would be wrong to suppose that Orphicism or the Mysteries suggested any definite doctrines to philosophers, at least during the period which we are about to consider. We have admitted that they really implied a new view of the soul, and we might therefore have expected to find that they profoundly modified men's theory of the world and their relation to it. The striking thing is

[1] For the Προτρεπτικός of Aristotle, see Bywater in *J. Phil.* ii. p. 55; Diels in *Arch.* i. p. 477; and the notes on *Ethics*, i. 5, in my edition.

[2] Plato, *Rep.* 520 C 1, καταβατέον οὖν ἐν μέρει. The allegory of the Cave seems to be Orphic, and I believe Professor Stewart's suggestion (*Myths of Plato*, p. 252, n. 2), that Plato had the κατάβασις εἰς Ἅιδου in mind, to be quite justified. The idea of rescuing the "spirits in prison" is thoroughly Orphic.

that this did not happen. Even those philosophers who were most closely in touch with the religious movement, like Empedokles and the Pythagoreans, held views about the soul which really contradicted the theory implied by their religious practices.[1] There is no room for an immortal soul in any philosophy of this period. Up to Plato's time immortality was never treated in a scientific way, but merely assumed in the Orphic rites, to which Plato half seriously turns for confirmation of his own teaching.[2]

All this is easily accounted for. With us a religious revival generally means the vivid realisation of a new or forgotten doctrine, while ancient religion has properly no doctrine at all. "The initiated," Aristotle said, "were not expected to learn anything, but merely to be affected in a certain way and put into a certain frame of mind."[3] Nothing was required but that the ritual should be correctly performed, and the worshipper was free to give any explanation of it he pleased. It might be as exalted as that of Pindar and Sophokles, or as material as that of the itinerant mystery-mongers described by Plato in the *Republic*. The essential thing was that he should duly sacrifice his pig.

I. Pythagoras of Samos

37. It is no easy task to give an account of Pythagoras that can claim to be regarded as history. Our Character of the tradition.

[1] For Empedokles, see § 119; for the Pythagoreans, see § 149.

[2] Cf. *Phd.* 69 c 2, *καὶ κινδυνεύουσι καὶ οἱ τὰς τελετὰς ἡμῖν οὗτοι καταστήσαντες οὐ φαῦλοί τινες εἶναι, ἀλλὰ τῷ ὄντι πάλαι αἰνίττεσθαι κ.τ.λ.* The gentle irony of this and similar passages ought to be unmistakable.

[3] Arist. fr. 45, 1483 a 19, *τοὺς τελουμένους οὐ μαθεῖν τι δεῖν, ἀλλὰ παθεῖν καὶ διατεθῆναι.*

principal sources of information[1] are the Lives composed by Iamblichos, Porphyry, and Laertios Diogenes. That of Iamblichos is a wretched compilation, based chiefly on the work of the arithmetician Nikomachos of Gerasa in Judaea, and the romance of Apollonios of Tyana, who regarded himself as a second Pythagoras, and accordingly took great liberties with his materials.[2] Porphyry stands, as a writer, on a far higher level than Iamblichos; but his authorities do not inspire us with more confidence. He, too, made use of Nikomachos, and of a certain novelist called Antonius Diogenes, author of a work entitled *Marvels from beyond Thule*.[3] Diogenes quotes, as usual, a considerable number of authorities, and the statements he makes must be estimated according to the nature of the sources from which they were drawn.[4] So far, it must be confessed, our material does not seem promising. Further examination shows, however, that a good many fragments of two much older authorities, Aristoxenos and Dikaiarchos, are embedded in the mass. These writers were both disciples of Aristotle; they were natives of Southern Italy, and contemporary with the last generation of the Pythagorean school. Both

[1] See E. Rohde's admirable papers, "Die Quellen des Iamblichus in seiner Biographie des Pythagoras" (*Rh. Mus.* xxvi., xxvii.).

[2] Iamblichos was a disciple of Porphyry, and contemporary with Constantine. The *Life of Pythagoras* has been edited by Nauck (1884). Nikomachos belongs to the beginning of the second century A.D. There is no evidence that he added anything to the authorities he followed, but these were already vitiated by Neopythagorean fables. Still, it is to him we chiefly owe the preservation of the valuable evidence of Aristoxenos.

[3] Porphyry's *Life of Pythagoras* is the only considerable extract from his *History of Philosophy*, in four books, that has survived. The romance of Antonius is the original parodied by Lucian in his *Vera Historia*.

[4] The importance of the life in Laertios Diogenes lies in the fact that it gives us the story current at Alexandria before the rise of Neopythagoreanism and the promulgation of the gospel according to Apollonios of Tyana.

wrote accounts of Pythagoras; and Aristoxenos, who was personally intimate with the last representatives of scientific Pythagoreanism, also made a collection of the sayings of his friends. Now the Neopythagorean story, as we have it in Iamblichos, is a tissue of incredible and fantastic myths; but, if we sift out the statements which go back to Aristoxenos and Dikaiarchos, we can easily construct a rational narrative, in which Pythagoras appears not as a miracle-monger and religious innovator, but simply as a moralist and statesman. We might then be tempted to suppose that this is the genuine tradition; but that would be altogether a mistake. There is, in fact, a third and still earlier stratum in the Lives, and this agrees with the latest accounts in representing Pythagoras as a wonder-worker and a religious reformer.

Some of the most striking miracles of Pythagoras are related on the authority of Andron's *Tripod*, and of Aristotle's work on the Pythagoreans.[1] Both these treatises belong to the fourth century B.C., and are therefore untouched by Neopythagorean fancies. Further, it is only by assuming the still earlier existence of this view that we can explain the allusions of Herodotos. The Hellespontine Greeks told him that Salmoxis or Zamolxis had been a slave of Pythagoras,[2] and Salmoxis is a figure of the same class as Abaris and Aristeas.

[1] Andron of Ephesos wrote a work on the Seven Wise Men, called *The Tripod*, in allusion to the well-known story. The feats ascribed to Pythagoras in the Aristotelian treatise remind us of an ecclesiastical legend. For example, he kills a deadly snake by biting it; he was seen at Kroton and Metapontion at the same time; he exhibited his golden thigh at Olympia, and was addressed by a voice from heaven when crossing the river Kasas. The same authority stated that he was identified by the Krotoniates with Apollo Hyperboreios (Arist. fr. 186).

[2] Herod. iv. 95.

It seems, then, that both the oldest and the latest accounts agree in representing Pythagoras as a man of the class to which Epimenides and Onomakritos belonged—in fact, as a sort of "medicine-man"; but, for some reason, there was an attempt to save his memory from this imputation, and that attempt belonged to the fourth century B.C. The significance of this will appear in the sequel.

Life of Pythagoras.

38. We may be said to know for certain that Pythagoras passed his early manhood at Samos, and was the son of Mnesarchos;[1] and he "flourished," we are told, in the reign of Polykrates.[2] This date cannot be far wrong; for Herakleitos already speaks of him in the past tense.[3]

The extensive travels attributed to Pythagoras by late writers are, of course, apocryphal. Even the statement that he visited Egypt, though far from improbable if we consider the close relations between Polykrates of Samos and Amasis, rests on no sufficient authority.[4] Herodotos, it is true, observes that the

[1] Cf. Herod. iv. 95, and Herakleitos, fr. 17 (R. P. 31 a). Herodotos represents him as living at Samos. On the other hand, Aristoxenos said that he came from one of the islands which the Athenians occupied after expelling the Tyrrhenians (Diog. viii. 1). This suggests Lemnos, from which the Tyrrhenian "Pelasgians" were expelled by Miltiades (Herod. vi. 140), or possibly some other island which was occupied at the same time. There were also Tyrrhenians at Imbros. This explains the story that he was an Etrurian or a Tyrian. Other accounts bring him into connexion with Phleious, but that is perhaps a pious invention of the Pythagorean society which flourished there at the beginning of the fourth century B.C. Pausanias (ii. 13, 1) gives it as a Phleiasian tradition that Hippasos, the great-grandfather of Pythagoras, had emigrated from Phleious to Samos.

[2] Eratosthenes identified Pythagoras with the Olympic victor of Ol. XLVIII. 1 (588/7 B.C.), but Apollodoros gave his *floruit* as 532/1, the era of Polykrates. He doubtless based this on the statement of Aristoxenos quoted by Porphyry (*V. Pyth.* 9), that Pythagoras left Samos from dislike to the tyranny of Polykrates (R. P. 53 a). For a full discussion, see Jacoby, pp. 215 sqq.

[3] Herakl. fr. 16, 17 (R. P. 31, 31 a).

[4] It occurs first in the *Bousiris* of Isokrates, § 28 (R. P. 52).

Egyptians agreed in certain practices with the rules called Orphic and Bacchic, which are really Egyptian, and with the Pythagoreans;[1] but this does not imply that the Pythagoreans derived these directly from Egypt. He says also in another place that the belief in transmigration came from Egypt, though certain Greeks, both at an earlier and a later date, had passed it off as their own. He refuses, however, to give their names, so he can hardly be referring to Pythagoras.[2] Nor does it matter; for the Egyptians did not believe in transmigration at all, and Herodotos was simply deceived by the priests or the symbolism of the monuments.

Aristoxenos said that Pythagoras left Samos in order to escape from the tyranny of Polykrates.[3] It was at Kroton, a city already famous for its medical school,[4] that he founded his society. How long he remained there we do not know; he died at Metapontion, whither he had retired on the first signal of revolt against his influence.[5]

[1] Herod. ii. 81 (R. P. 52 a). The comma at *Αἰγυπτίοισι* is clearly right. Herodotos believed that the worship of Dionysos was introduced from Egypt by Melampous (ii. 49), and he means to suggest that the Orphics got these practices from the worshippers of Bakchos, while the Pythagoreans got them from the Orphics.

[2] Herod. ii. 123 (R. P. *ib.*). The words "whose names I know, but do not write" cannot refer to Pythagoras; for it is only of contemporaries that Herodotos speaks in this way (cf. i. 51; iv. 48). Stein's suggestion that he meant Empedokles seems to me convincing. Herodotos may have met him at Thourioi. Nor is there any reason to suppose that *οἱ μὲν πρότερον* refers specially to the Pythagoreans. If Herodotos had ever heard of Pythagoras visiting Egypt, he would surely have said so in one or other of these passages. There was no occasion for reserve, as Pythagoras must have died before Herodotos was born.

[3] Porph. *V. Pyth.* 9 (R. P. 53 a).

[4] From what Herodotos tells us of Demokedes (iii. 131) we can see that the medical school of Kroton was founded before the time of Pythagoras. Cf. Wachtler, *De Alcmaeone Crotoniata*, p. 91.

[5] It may be taken as certain that Pythagoras spent his last days at

The Order. 39. There is no reason to believe that the detailed statements which have been handed down with regard to the organisation of the Pythagorean Order rest upon any historical basis, and in the case of many of them we can still see how they came to be made. The distinction of grades within the Order, variously called *Mathematicians* and *Akousmatics*, *Esoterics* and *Exoterics*, *Pythagoreans* and *Pythagorists*,[1] is an invention designed to explain how there came to be two widely different sets of people, each calling themselves disciples of Pythagoras, in the fourth century B.C. So, too, the statement that the Pythagoreans were bound to inviolable secrecy, which goes back to Aristoxenos,[2] is intended to explain why there is no trace of the Pythagorean philosophy proper before Philolaos.

The Pythagorean Order was simply, in its origin, a religious fraternity of the type described above, and not, as has sometimes been maintained, a political league.[3] Nor had it anything to do with the "Dorian aristocratic

Metapontion; Aristoxenos said so (*ap.* Iambl. *V. Pyth.* 249), and Cicero (*De Fin.* v. 4) speaks of the honours which continued to be paid to his memory in that city (R. P. 57 c). Cf. also Andron, fr. 6 (*F.H.G.* ii. 347).

[1] For these distinctions, see Porphyry (*V. Pyth.* 37) and Iamblichos (*V. Pyth.* 80), quoted R. P. 56 and 56 b. The name ἀκουσματικοί is clearly related to the ἀκούσματα, with which we shall have to deal shortly (§ 44).

[2] For the "mystic silence," see Aristoxenos, *ap.* Diog. viii. 15 (R. P. 55 a). Tannery, "Sur le secret dans l'école de Pythagore" (*Arch.* i. pp. 28 sqq.), thinks that the mathematical doctrines were the secrets of the school, and that these were divulged by Hippasos; but the most reasonable view is that there were no secrets at all except of a ritual kind.

[3] Plato, *Rep.* x. 600 a, implies that Pythagoras held no public office. The view that the Pythagorean sect was a political league, maintained in modern times by Krische (*De societatis a Pythagora conditae scopo politico*, 1830), goes back, as Rohde has shown (*loc. cit.*), to Dikaiarchos, the champion of the "Practical Life," just as the view that it was primarily a scientific society goes back to the mathematician and musician Aristoxenos. The former antedated Archytas, just as the latter antedated Philolaos (see Chap. VII. § 138). Grote's good sense enabled him to see this quite clearly (vol. iv. pp. 329 sqq.).

ideal." Pythagoras was an Ionian, and the Order was originally confined to Achaian states.[1] Nor is there the slightest evidence that the Pythagoreans favoured the aristocratic rather than the democratic party.[2] The main purpose of the Order was to secure for its own members a more adequate satisfaction of the religious instinct than that supplied by the State religion. It was, in fact, an institution for the cultivation of holiness. In this respect it resembled an Orphic society, though it seems that Apollo, rather than Dionysos, was the chief Pythagorean god. That is doubtless why the Krotoniates identified Pythagoras with Apollo Hyperboreios.[3] From the nature of the case, however, an independent society within a Greek state was apt to be brought into conflict with the larger body. The

[1] Meyer, *Gesch. des Alterth.* ii. § 502, Anm. It is still necessary to insist upon this, as the idea that the Pythagoreans represented the "Dorian ideal" dies very hard. In his *Kulturhistorische Beiträge* (Heft i. p. 59), Max C. P. Schmidt imagines that later writers call the founder of the sect Pythagoras instead of Pythagores, as he is called by Herakleitos and Demokritos, because he had become "a Dorian of the Dorians." The fact is simply that Πυθαγόρας is the Attic form of Πυθαγόρης, and that the writers in question wrote Attic. Similarly, Plato calls Archytas, who did belong to a Dorian state, Archytes, though Aristoxenos and others retained the Dorian form of his name.

[2] Kylon, the chief opponent of the Pythagoreans, is described by Aristoxenos (Iambl. *V. Pyth.* 248) as γένει καὶ δόξῃ καὶ πλούτῳ πρωτεύων τῶν πολιτῶν. Taras, later the chief seat of the Pythagoreans, was a democracy. The truth is that, at this time, the new religion appealed to the people rather than the aristocracies, which were apt to be "free-thinking" (Meyer, *Gesch. des Alt.* iii. § 252). Xenophanes, not Pythagoras, is their man.

[3] We have the authority of Aristotle, fr. 186, 1510 b 20, for the identification of Pythagoras with Apollo Hyperboreios. The names of Abaris and Aristeas stand for a mystical movement parallel to the Orphic, but based on the worship of Apollo. The later tradition makes them predecessors of Pythagoras; and that this has some historical basis, appears from Herod. iv. 13 sqq., and above all from the statement that Aristeas had a statue at Metapontion, where Pythagoras died. The connexion of Pythagoras with Zamolxis belongs to the same order of ideas. As the legend of the Hyperboreans is Delian, we see that the religion taught by Pythagoras was genuinely Ionian in its origin.

only way in which it could then assert its right to exist was by identifying the State with itself, that is, by securing the control of the sovereign power. The history of the Pythagorean Order, so far as it can be traced, is, accordingly, the history of an attempt to supersede the State; and its political action is to be explained as a mere incident of that attempt.

Downfall of the Order.

40. For a time the new Order seems actually to have succeeded in securing the supreme power, but reaction came at last. Under the leadership of Kylon, a wealthy noble, Kroton was able to assert itself victoriously against the Pythagorean domination. This, we may well believe, had been galling enough. The "rule of the saints" would be nothing to it; and we can still imagine and sympathise with the irritation felt by the plain man of those days at having his legislation done for him by a set of incomprehensible pedants, who made a point of abstaining from beans, and would not let him beat his own dog because they recognised in its howls the voice of a departed friend (Xenophanes, fr. 7). This feeling would be aggravated by the private religious worship of the Society. Greek states could never pardon the introduction of new gods. Their objection to this was not, however, that the gods in question were false gods. If they had been, it would not have mattered so much. What they could not tolerate was that any one should establish a private means of communication between himself and the unseen powers. That introduced an unknown and incalculable element into the arrangements of the State, which might very likely be hostile to those citizens who had no means of propitiating the intruding divinity.

Aristoxenos's version of the events which led to the

downfall of the Pythagorean Order is given at length by Iamblichos. According to this, Pythagoras had refused to receive Kylon into his Society, and he therefore became a bitter foe of the Order. From this cause Pythagoras removed from Kroton to Metapontion, where he died. The Pythagoreans, however, still retained possession of the government of Kroton, till at last the partisans of Kylon set fire to Milo's house, where they were assembled. Of those in the house only two, Archippos and Lysis, escaped. Archippos retired to Taras; Lysis, first to Achaia and then to Thebes, where he became later on the teacher of Epameinondas. The Pythagoreans who remained concentrated themselves at Rhegion; but, as things went from bad to worse, they all left Italy except Archippos.[1]

This account has all the air of being historical. The mention of Lysis proves, however, that those events were spread over more than one generation. The *coup d'état* of Kroton can hardly have occurred before 450 B.C., if the teacher of Epameinondas escaped from it, and it may well have been even later. But it must have been before 410 B.C. that the Pythagoreans left Rhegion for Hellas; Philolaos was certainly at Thebes about that time.[2]

[1] See Rohde, *Rh. Mus.* xxvi. p. 565, n. 1. The narrative in the text (Iambl. *V. Pyth.* 250; R. P. 59 b) goes back to Aristoxenos and Dikaiarchos (R. P. 59 a). There is no reason to suppose that their view of Pythagoras has vitiated their account of what must have been a perfectly well-known piece of history. According to the later story, Pythagoras himself was burned to death in the house of Milo, along with his disciples. This is merely a dramatic compression of the whole series of events into a single scene; we have seen that Pythagoras died at Metapontion before the final catastrophe. The valuable reference in Polybios ii. 39 (R. P. 59) to the burning of Pythagorean *συνέδρια* certainly implies that the disturbances went on for a very considerable time.

[2] Plato, *Phd.* 61 d 7, e 7.

The political power of the Pythagoreans as an Order was now gone for ever, though we shall see that some of them returned to Italy at a later date. In exile they seem to have dropped the merely magical and superstitious parts of their system, and this enabled them to take their place as one of the scientific schools of Hellas.

Want of evidence as to the teaching of Pythagoras.

41. Of the opinions of Pythagoras we know even less than of his life. Aristotle clearly knew nothing for certain of ethical or physical doctrines going back to the founder of the Society himself.[1] Aristoxenos only gave a string of moral precepts.[2] Dikaiarchos is quoted by Porphyry as asserting that hardly anything of what Pythagoras taught his disciples was known except the doctrine of transmigration, the periodic cycle, and the kinship of all living creatures.[3] The fact is, that, like all teachers who introduce a new way of living rather than a new view of the world, Pythagoras preferred oral instruction to the dissemination of his opinions by writing, and it was not till Alexandrian times that any one ventured to forge books in his

[1] When discussing the Pythagorean system, Aristotle always refers it to "the Pythagoreans," not to Pythagoras himself. That this was intentional seems to be proved by the phrase οἱ καλούμενοι Πυθαγόρειοι, which occurs more than once (*e.g. Met.* A, 5. 985 b 23; *de Caelo*, B, 13. 293 a 20). Pythagoras himself is only thrice mentioned in the whole Aristotelian corpus, and in only one of these places (*M. Mor.* 1182 a 11) is any philosophical doctrine ascribed to him. We are told there that he was the first to discuss the subject of goodness, and that he made the mistake of identifying its various forms with numbers. But this is just one of the things which prove the late date of the *Magna Moralia.* Aristotle himself is quite clear that what he knew as the Pythagorean system belonged in the main to the days of Empedokles, Anaxagoras, and Leukippos; for, after mentioning these, he goes on to describe the Pythagoreans as "contemporary with and earlier than them" (ἐν δὲ τούτοις καὶ πρὸ τούτων, *Met.* A, 5. 985 b 23).

[2] The fragments of the Πυθαγορικαὶ ἀποφάσεις of Aristoxenos are given by Diels, *Vors.* pp. 282 sqq.

[3] *V. Pyth.* 19 (R. P. 55).

name. The writings ascribed to the earliest Pythagoreans were also forgeries of the same period.[1] The early history of Pythagoreanism is, therefore, wholly conjectural; but we may still make an attempt to understand, in a very general way, what the position of Pythagoras in the history of Greek thought must have been.

42. In the first place, then, there can be no doubt that he really taught the doctrine of transmigration.[2] Transmigration. The story told by the Greeks of the Hellespont and Pontos as to his relations with Salmoxis could never have gained currency by the time of Herodotos if he had not been known as a man who taught strange views of the life after death.[3] Now the doctrine of transmigration is most easily to be explained as a development of the savage belief in the kinship of men and beasts, as all alike children of the Earth,[4] a view which Dikaiarchos said Pythagoras certainly held. Further, among savages, this belief is commonly associated with a system of taboos on certain kinds of food, and the Pythagorean rule is best known for its prescription of similar forms of abstinence. This in itself goes far to show that it originated in the same ideas, and we have seen that the revival of these would be quite natural in connexion with the foundation of a new religious society. There is a further considera-

[1] See Diels, *Dox.* p. 150; and "Ein gefälschtes Pythagorasbuch" (*Arch.* iii. pp. 451 sqq.). Cf. also Bernays, *Die Heraklitischen Briefe*, n. 1.

[2] The proper Greek term for this is παλιγγενεσία, and the inaccurate μετεμψύχωσις only occurs in late writers. Hippolytos and Clement of Alexandria say μετενσωμάτωσις, which is accurate but cumbrous. See Rohde, *Psyche*, p. 428, n. 2.

[3] On the significance of this, see above, p. 93.

[4] Dieterich, "Mutter Erde" (*Archiv für Religionswissenschaft*, viii. pp. 29 and 47).

tion which tells strongly in the same direction. In India we have a precisely similar doctrine, and yet it is not possible to assume any actual borrowing of Indian ideas at this date. The only explanation which will account for the facts is that the two systems were independently evolved from the same primitive ideas. These are found in many parts of the world; but it seems to have been only in India and in Greece that they were developed into an elaborate doctrine.

Abstinence. 43. It has indeed been doubted whether we have a right to accept what we are told by such late writers as Porphyry on the subject of Pythagorean abstinence. Aristoxenos, whom we have admitted to be one of our earliest witnesses, may be cited to prove that the original Pythagoreans knew nothing of these restrictions on the use of animal flesh and beans. He undoubtedly said that Pythagoras did not abstain from animal flesh in general, but only from that of the ploughing ox and the ram.[1] He also said that Pythagoras preferred beans to every other vegetable, as being the most laxative, and that he was partial to sucking-pigs and tender kids.[2] Aristoxenos, however, is a witness who very often breaks down under cross-examination, and the palpable exaggeration of these statements shows that he is endeavouring to combat a belief

[1] Aristoxenos *ap.* Diog. viii. 20, *πάντα μὲν τὰ ἄλλα συγχωρεῖν αὐτὸν ἐσθίειν ἔμψυχα, μόνον δ' ἀπέχεσθαι βοὸς ἀροτῆρος καὶ κριοῦ.*

[2] Aristoxenos *ap.* Gell. iv. 11, 5, *Πυθαγόρας δὲ τῶν ὀσπρίων μάλιστα τὸν κύαμον ἐδοκίμασεν· λειαντικόν τε γὰρ εἶναι καὶ διαχωρητικόν· διὸ καὶ μάλιστα κέχρηται αὐτῷ*; *ib.* 6, "porculis quoque minusculis et haedis tenerioribus victitasse, idem Aristoxenus refert." It is, of course, possible that Aristoxenos may be right about the taboo on beans. We know that it was Orphic, and it may have been transferred to the Pythagoreans by mistake. That, however, would not affect the general conclusion that at least some Pythagoreans practised abstinence from various kinds of food, which is all that is required.

which existed in his own day. We are therefore able to show, out of his own mouth, that the tradition which made the Pythagoreans abstain from animal flesh and beans goes back to a time long before there were any Neopythagoreans interested in upholding it. Still, it may be asked what motive Aristoxenos could have had for denying the common belief? The answer is simple and instructive. He had been the friend of the last of the Pythagoreans; and, in their time, the merely superstitious part of Pythagoreanism had been dropped, except by some zealots whom the heads of the Society refused to acknowledge. That is why he represents Pythagoras himself in so different a light from both the older and the later traditions; it is because he gives us the view of the more enlightened sect of the Order. Those who clung faithfully to the old practices were now regarded as heretics, and all manner of theories were set on foot to account for their existence. It was related, for instance, that they descended from one of the "Akousmatics," who had never been initiated into the deeper mysteries of the "Mathematicians."[1] All this, however, is pure invention. The satire of the poets of the Middle Comedy proves clearly enough that, even though the friends of Aristoxenos did not practise abstinence, there were plenty of people in the fourth century, calling themselves followers of Pythagoras, who did.[2] History has not been kind to the

[1] The sect of the "Akousmatics" was said to descend from Hippasos (Iambl. *V. Pyth.* 81; R. P. 56). Now Hippasos was the author of a μυστικὸς λόγος (Diog. viii. 7; R. P. 56 c), that is to say, of a superstitious ceremonial or ritual handbook, probably containing Akousmata like those we are about to consider; for we are told that it was written ἐπὶ διαβολῇ Πυθαγόρου.

[2] Diels has collected these fragments in a convenient form (*Vors.* pp. 291 sqq.). For our purpose the most important passages are Antiphanes, fr. 135,

Akousmatics, but they never wholly died out. The names of Diodoros of Aspendos and Nigidius Figulus help to bridge the gulf between them and Apollonios of Tyana.

We know, then, that Pythagoras taught the kinship of beasts and men, and we infer that his rule of abstinence from flesh was based, not upon humanitarian or ascetic grounds, but on taboo. This is strikingly confirmed by a fact which we are told in Porphyry's *Defence of Abstinence*. The statement in question does not indeed go back to Theophrastos, as so much of Porphyry's tract certainly does;[1] but it is, in all probability, due to Herakleides of Pontos, and is to the effect that, though the Pythagoreans did as a rule abstain from flesh, they nevertheless ate it when they sacrificed to the gods.[2] Now, among savage peoples, we often find that the sacred animal is slain and eaten

Kock, *ὥσπερ Πυθαγορίζων ἐσθίει | ἔμψυχον οὐδέν*; Alexis, fr. 220, *οἱ Πυθαγορίζοντες γάρ, ὡς ἀκούομεν, | οὔτ' ὄψον ἐσθίουσιν οὔτ' ἄλλ' οὐδὲ ἓν | ἔμψυχον*; fr. 196 (from the Πυθαγορίζουσα), *ἡ δ' ἑστίασις ἰσχάδες καὶ στέμφυλα | καὶ τυρὸς ἔσται· ταῦτα γὰρ θύειν νόμος | τοῖς Πυθαγορείοις*; Aristophon, fr. 9 (from the Πυθαγοριστής), *πρὸς τῶν θεῶν οἰόμεθα τοὺς πάλαι ποτέ, | τοὺς Πυθαγοριστὰς γενομένους ὄντως ῥυπᾶν | ἑκόντας ἢ φορεῖν τριβῶνας ἡδέως*; Mnesimachos, fr. 1, *ὡς Πυθαγοριστὶ θύομεν τῷ Λοξίᾳ | ἔμψυχον οὐδὲν ἐσθίοντες παντελῶς*. See also Theokritos, xiv. 5, *τοιοῦτος καὶ πρᾶν τις ἀφίκετο Πυθαγορικτάς, | ὠχρὸς κἀνυπόδητος· Ἀθηναῖος δ' ἔφατ' ἦμεν.*

[1] See Bernays, *Theophrastos' Schrift über Frömmigkeit*. Porphyry's tract, *Περὶ ἀποχῆς ἐμψύχων*, was doubtless saved from the general destruction of his writings by its conformity to the ascetic tendencies of the age. Even St. Jerome made constant use of it in his polemic against Iovianus, though he is careful not to mention Porphyry's name (*Theophr. Schr.* n. 2). The tract is addressed to Castricius Firmus, the disciple and friend of Plotinos, who had fallen away from the strict vegetarianism of the Pythagoreans.

[2] The passage occurs *De Abst.* p. 58, 25 Nauck: *ἱστοροῦσι δέ τινες καὶ αὐτοὺς ἅπτεσθαι τῶν ἐμψύχων τοὺς Πυθαγορείους, ὅτε θύοιεν θεοῖς.* The part of the work from which this is taken comes from one Clodius, on whom see Bernay, *Theophr. Schr.* p. 11. He was probably the rhetorician Sextus Clodius, and a contemporary of Cicero. Bernays has shown that he made use of the work of Herakleides of Pontos (*ib.* n. 19). On "mystic sacrifice" generally, see Robertson Smith, *Rel. Sem.* i. p. 276.

sacramentally by its kinsmen on certain solemn occasions, though in ordinary circumstances this would be the greatest of all impieties. Here, again, we have to do with a very primitive belief; and we need not therefore attach any weight to the denials of Aristoxenos.[1]

44. We shall now know what to think of the various *Akousmata.* Pythagorean rules and precepts which have come down to us. These are of two kinds, and have very different sources. Some of them, derived from the collection of Aristoxenos, and for the most part preserved by Iamblichos, are mere precepts of morality. They do not pretend to go back to Pythagoras himself; they are only the sayings which the last generation of "Mathematicians" heard from their predecessors.[2] The second class is of a very different nature, and the sayings which belong to it are called *Akousmata*,[3] which points to their being the property of that sect of Pythagoreans which had faithfully preserved the old customs. Later writers interpret them as "symbols" of moral truth; but their interpretations are extremely far-fetched, and it does not require a very practised eye to see that they are genuine taboos of a thoroughly primitive type.

[1] Porphyry (*V. Pyth.* c 15) has preserved a tradition to the effect that Pythagoras recommended a flesh diet for athletes (Milo?). This story must have originated at the same time as those related by Aristoxenos, and in a similar way. In fact, Bernays has shown that it comes from Herakleides of Pontos (*Theophr. Schr.* n. 8). Iamblichos (*V. Pyth.* 5. 25) and others (Diog. viii. 13, 47) got out of this by supposing it referred to a gymnast of the same name. We see here very distinctly how the Neoplatonists for their own ends endeavoured to go back to the original form of the Pythagorean legend, and to explain away the fourth century reconstruction.

[2] For these see Diels, *Vors.* pp. 282 sqq.

[3] There is an excellent collection of Ἀκούσματα καὶ σύμβολα in Diels, *Vors.* pp. 279 sqq., where the authorities will be found. It is impossible to discuss these in detail here, but students of folklore will see at once to what order of ideas they belong.

I give a few examples in order that the reader may judge what the famous Pythagorean rule of life was really like.

1. To abstain from beans.
2. Not to pick up what has fallen.
3. Not to touch a white cock.
4. Not to break bread.
5. Not to step over a crossbar.
6. Not to stir the fire with iron.
7. Not to eat from a whole loaf.
8. Not to pluck a garland.
9. Not to sit on a quart measure.
10. Not to eat the heart.
11. Not to walk on highways.
12. Not to let swallows share one's roof.
13. When the pot is taken off the fire, not to leave the mark of it in the ashes, but to stir them together.
14. Do not look in a mirror beside a light.
15. When you rise from the bedclothes, roll them together and smooth out the impress of the body.

It would be easy to multiply proofs of the close connexion between Pythagoreanism and primitive modes of thought, but what has been said is really sufficient for our purpose. The kinship of men and beasts, the abstinence from flesh, and the doctrine of transmigration all hang together and form a perfectly intelligible whole from the point of view which has been indicated.

Pythagoras as a man of science.

45. Were this all, we should be tempted to delete the name of Pythagoras from the history of philosophy altogether, and relegate him to the class of "medicine-men" (γόητες) along with Epimenides and Onomakritos. This, however, would be quite wrong. As we shall see, the Pythagorean Society became one of the chief scientific schools of Hellas, and it is certain that Pythagorean

science as well as Pythagorean religion originated with the master himself. Herakleitos, who is not partial to him, says that Pythagoras had pursued scientific investigation further than other men, though he also says that he turned his much learning into an art of mischief.[1] Herodotos called Pythagoras "by no means the weakest sophist of the Hellenes," a title which at this date does not imply the slightest disparagement.[2] Aristotle even said that Pythagoras first busied himself with mathematics and numbers, and that it was later on he attached himself to the miracle-mongering of Pherekydes.[3] Is it possible for us to trace any connexion between these two sides of his activity?

We have seen that the aim of the Orphic and other *Orgia* was to obtain release from the "wheel of birth" by means of "purifications," which were generally of a very primitive type. The new thing in the Society founded by Pythagoras seems to have been that, while it admitted all these half-savage customs, it at the same time suggested a more exalted idea of what "purification" really was. Aristoxenos tells us that the Pythagoreans employed music to purge the soul as they used medicine to purge the body, and it is abundantly clear that Aristotle's famous theory of *κάθαρσις* is derived from Pythagorean sources.[4] Such

[1] Herakl. fr. 17 (R. P. 31 a). The word *ἱστορίη* is in itself quite general. What it chiefly means here we see from a valuable notice preserved by Iamblichos, *V. Pyth.* 89, *ἐκαλεῖτο δὲ ἡ γεωμετρία πρὸς Πυθαγόρου ἱστορία.* Tannery's interpretation of this statement is based on a misunderstanding, and need not be discussed here.

[2] Herod. iv. 95.

[3] Arist. *Περὶ τῶν Πυθαγορείων*, fr. 186, 1510 a 39, *Πυθαγόρας Μνησάρχου υἱὸς τὸ μὲν πρῶτον διεπονεῖτο περὶ τὰ μαθήματα καὶ τοὺς ἀριθμούς, ὕστερον δέ ποτε καὶ τῆς Φερεκύδου τερατοποιΐας οὐκ ἀπέστη.*

[4] Its immediate source is to be found in Plato, *Laws*, 790 d 2 sqq.,

methods of purifying the soul were familiar in the *Orgia* of the Korybantes, and will serve to explain the Pythagorean interest in Harmonics. But there is more than this. If we can trust Herakleides so far, it was Pythagoras who first distinguished the "three lives," the Theoretic, the Practical, and the Apolaustic, which Aristotle made use of in the *Ethics*. The general theory of these lives is clear, and it is impossible to doubt that in substance it belongs to the very beginning of the school. It is to this effect. We are strangers in this world, and the body is the tomb of the soul, and yet we must not seek to escape by self-murder; for we are the chattels of God who is our herdsman, and without his command we have no right to make our escape.[1] In this life, there are three kinds of men, just as there are three sorts of people who come to the Olympic Games. The lowest class is made up of those who come to buy and sell, and next above them are those who come to compete. Best of all, however, are those who come simply to look on (θεωρεῖν). The greatest purification of all is, therefore, disinterested science, and it is the man who devotes himself to that, the true philosopher, who has most effectually released himself from the "wheel of birth." It would be rash to say that Pythagoras expressed himself exactly in this manner; but all these ideas are genuinely Pythagorean, and it is only in some such way that we can bridge the gulf which separates Pythagoras the man of science

where the Korybantic rites are adduced as an instance. For a full account see Rohde, *Psyche*, p. 336, n. 2.

[1] Plato gives this as the Pythagorean view in *Phd.* 62 b, for the interpretation of which cf. Espinas in *Arch.* viii. pp. 449 sqq. Plato distinctly implies that it was not merely the theory of Philolaos, but something older.

from Pythagoras the religious teacher.[1] We must now endeavour to discover how much of the later Pythagorean science may reasonably be ascribed to Pythagoras himself.

46. In his treatise on Arithmetic, Aristoxenos said that Pythagoras was the first to carry that study beyond the needs of commerce,[2] and his statement is confirmed by everything we otherwise know. By the end of the fifth century B.C., we find that there is a widespread interest in such subjects and that these are studied for their own sake. Now this new interest cannot have been wholly the work of a school; it must have originated with some great man, and there is no one but Pythagoras to whom we can refer it. As, however, he wrote nothing, we have no sure means of distinguishing his own teaching from that of his followers in the next generation or two. All we can safely say is that, the more primitive any Pythagorean doctrine appears, the more likely it is to be that of Pythagoras himself, and all the more so if it can be shown to have points of contact with views which we Arithmetic.

[1] See Döring in *Arch.* v. pp. 505 sqq. There seems to be a reference to the theory of the "three lives" in Herakleitos, fr. 111. It was apparently taught in the Pythagorean Society of Phleious; for Herakleides made Pythagoras expound it in a conversation with the tyrant of Phleious (Cic. *Tusc.* v. 3; Diog. pr. 12, viii. 8), and it is developed by Plato in a dialogue which is, as it were, dedicated to Echekrates. If it should be thought that this is interpreting Pythagoras too much in the light of Schopenhauer, it may be answered that even the Orphics came very near such a theory. The soul must not drink of Lethe, but go past it and drink of the water of Memory, before it can claim to become one of the heroes. This has obvious points of contact with Plato's *ἀνάμνησις*, and the only question is how much of the *Phaedo* we are to ascribe to Pythagorean sources. A great deal, I suspect. See Prof. Stewart's *Myths of Plato*, pp. 152 sqq.

[2] Stob. i. p. 20, 1, *ἐκ τῶν Ἀριστοξένου περὶ ἀριθμητικῆς, Τὴν δὲ περὶ τοὺς ἀριθμοὺς πραγματείαν μάλιστα πάντων τιμῆσαι δοκεῖ Πυθαγόρας καὶ προαγαγεῖν ἐπὶ τὸ πρόσθεν ἀπαγαγὼν ἀπὸ τῆς τῶν ἐμπόρων χρείας.*

know to have been held in his own time or shortly before it. In particular, when we find the later Pythagoreans teaching things that were already something of an anachronism in their own day, we may be reasonably sure that we are dealing with survivals which only the authority of the master's name could have preserved. Some of these must be mentioned at once, though the developed system belongs to a later part of our story. It is only by separating its earliest form from its later that the true place of Pythagoreanism in Greek thought can be made clear, though we must always remember that no one can now pretend to draw the line between its successive stages with any certainty.

The figures. 47. Now one of the most remarkable statements that we have about Pythagoreanism is what we are told of Eurytos on the unimpeachable authority of Archytas. Eurytos was the disciple of Philolaos, and Aristoxenos expressly mentioned him along with Philolaos as having taught the last of the Pythagoreans, the men with whom he himself was personally acquainted. He therefore belongs to the beginning of the fourth century B.C., by which time the Pythagorean system was fully developed, and he was no eccentric enthusiast, but one of the foremost men in the school.[1] We are told of him, then, that he used to give the number of all sorts of things, such as horses and men, and that he demonstrated these by arranging pebbles in a certain way. It is to be noted further that Aristotle compares his procedure to that of those

[1] Apart from the story in Iamblichos (*V. Pyth.* 148) that Eurytos heard the voice of Philolaos from the grave after he had been many years dead, it is to be noticed that he is mentioned after him in the statement of Aristoxenos referred to (Diog. viii. 46; R. P. 62).

who bring numbers into figures like the triangle and the square.[1]

Now these statements, and especially the remark of Aristotle last quoted, seem to imply the existence at this date, and earlier, of a numerical symbolism quite distinct from the alphabetical notation on the one hand and from the Euclidean representation of numbers by lines on the other. The former was inconvenient for arithmetical purposes, just because the zero was one of the few things the Greeks did not invent, and they were therefore unable to develop a really serviceable numerical symbolism based on position. The latter, as will appear shortly, is intimately bound up with that absorption of arithmetic by geometry, which is at least as old as Plato, but cannot be primitive.[2] It seems rather that numbers were represented by dots arranged in symmetrical and easily recognised patterns, of which the marking of dice or dominoes gives us the best idea. And these markings are, in fact, the best proof that this is a genuinely primitive method of indicating numbers; for they are of unknown antiquity, and go back to the time when men could only count by arranging numbers in such patterns, each of which became, as it were, a fresh unit. This way of counting may well be as old as reckoning with the fingers, or even older.

[1] Arist. *Met.* N, 5. 1092 b 8 (R. P. 76 a). Aristotle does not quote the authority of Archytas here, but the source of his statement is made quite clear by Theophr. *Met.* p. vi. a 19 (Usener), *τοῦτο γὰρ* (sc. *τὸ μὴ μέχρι του προελθόντα παύεσθαι) τελέου καὶ φρονοῦντος, ὅπερ Ἀρχύτας ποτ᾽ ἔφη ποιεῖν* Εὔρυτον *διατιθέντα τινὰς ψήφους· λέγειν γὰρ ὡς ὅδε μὲν ἀνθρώπου ὁ ἀριθμός, ὅδε δὲ ἵππου, ὅδε δ᾽ ἄλλου τινὸς τυγχάνει.*

[2] Arithmetic is older than geometry, and was much more advanced in Egypt, though still in the form which the Greeks called *λογιστική* rather than as *ἀριθμητική* proper. Even Plato puts Arithmetic before Geometry in the *Republic* in deference to the tradition. His own theory of number, however, suggested the inversion of this order which we find carried out in Euclid.

It is, therefore, very significant that we do not find any adequate account of what Aristotle can have meant by "those who bring numbers into figures like the triangle and the square" till we come to certain late writers who called themselves Pythagoreans, and revived the study of arithmetic as a science independent of geometry. These men not only abandoned the linear symbolism of Euclid, but also regarded the alphabetical notation, which they did use, as something conventional, and inadequate to represent the true nature of number. Nikomachos of Gerasa says expressly that the letters used to represent numbers are only significant by human usage and convention. The most natural way would be to represent linear or prime numbers by a row of units, polygonal numbers by units arranged so as to mark out the various plane figures, and solid numbers by units disposed in pyramids and so forth.[1] He therefore gives us figures like this:—

		a	*a a*	*a*	*aaa*	*a a a*
a	*aa*			*a a*		*a a a*
		a a	*a a*	*a a*	*aaa*	*a a a*

Now it ought to be obvious that this is no innovation, but, like so many things in Neopythagoreanism, a reversion to primitive usage. Of course the employment of the letter *alpha* to represent the units is derived from the conventional notation; but otherwise we are clearly in presence of something which belongs to the very earliest stage of the science—something, in fact,

[1] Nikomachos of Gerasa, *Introd. Arithm.* p. 83, 12, Hoche, *Πρότερον δὲ ἐπιγνωστέον ὅτι ἕκαστον γράμμα ᾧ σημειούμεθα ἀριθμόν, οἷον τὸ ι, ᾧ τὸ δέκα, τὸ κ, ᾧ τὰ εἴκοσι, τὸ ω, ᾧ τὰ ὀκτακόσια, νόμῳ καὶ συνθήματι ἀνθρωπίνῳ, ἀλλ' οὐ φύσει σημαντικόν ἐστι τοῦ ἀριθμοῦ κ.τ.λ.* The same symbolism is used by Theo, *Expositio*, pp. 31 sqq. Cf. also Iambl. *Introd.* p. 56, 27, Pistelli, *ἰστέον γὰρ ὡς τὸ παλαιὸν φυσικώτερον οἱ πρόσθεν ἐσημαίνοντο τὰς τοῦ ἀριθμοῦ ποσότητας, ἀλλ' οὐχ ὥσπερ οἱ νῦν συμβολικῶς.*

which gives the only possible clue to the meaning of Aristotle's remark, and to what we are told of the method of Eurytos.

48. This is still further confirmed by the tradition which represents the great revelation made by Pythagoras to mankind as having been precisely a figure of this kind, namely the *tetraktys*, by which the Pythagoreans used to swear,[1] and we have no less an authority than Speusippos for holding that the whole theory which it implies was genuinely Pythagorean.[2] In later days there were many kinds of *tetraktys*,[3] but the original one, that by which the Pythagoreans swore, was the "tetraktys of the dekad." It was a figure like this— **Triangular, square, and oblong numbers.**

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and represented the number ten as the triangle of four. In other words, it showed at a glance that $1 + 2 + 3 + 4 = 10$. Speusippos tells us of several properties which the Pythagoreans discovered in the dekad. It is, for instance, the first number that has in it an equal number of prime and composite numbers. How much

[1] Cf. the formula Οὐ μὰ τὸν ἁμετέρᾳ γενεᾷ παραδόντα τετρακτύν, which is all the more likely to be old that it is put into the mouth of Pythagoras by the forger of the Χρυσᾶ ἔπη, thus making him swear by himself! See Diels, *Arch.* iii. p. 457. The Doric dialect shows, however, that it belongs to the later generations of the school.

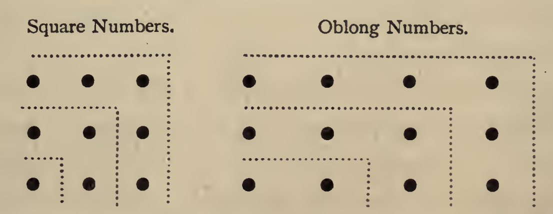
[2] Speusippos wrote a work on the Pythagorean numbers, based chiefly on Philolaos, and a considerable fragment of it is preserved in the *Theologumena Arithmetica*. It will be found in Diels, *Vorsokratiker*, p. 235, 15, and is discussed by Tannery, *Science hellène*, pp. 374 sqq.

[3] For these see Theon, *Expositio*, pp. 93 sqq. Hiller. The τετρακτὺς used by Plato in the *Timaeus* is the second described by Theon (*Exp.* p. 94, 10 sqq.). It is no doubt Pythagorean, but hardly as old as Pythagoras.

of this goes back to Pythagoras himself, we cannot tell; but we are probably justified in referring to him the conclusion that it is "according to nature" that all Hellenes and barbarians count up to ten and then begin over again.

It is obvious that the *tetraktys* may be indefinitely extended so as to exhibit the sums of the series of successive numbers in a graphic form, and these sums are accordingly called "triangular numbers."

For similar reasons, the sums of the series of successive odd numbers are called "square numbers," and those of successive even numbers "oblong." If odd numbers are added to the unit in the form of *gnomons*, the result is always a similar figure, namely a square, while, if even numbers are added, we get a series of rectangles,[1] as shown by the figure :—



It is clear, then, that we are entitled to refer the study of sums of series to Pythagoras himself; but

[1] Cf. Milhaud, *Philosophes géomètres*, pp. 115 sqq. Aristotle puts the matter thus (*Phys.* Γ, 4. 203 a 13): *περιτιθεμένων γὰρ τῶν γνωμόνων περὶ τὸ ἓν καὶ χωρὶς ὁτὲ μὲν ἄλλο ἀεὶ γίγνεσθαι τὸ εἶδος, ὁτὲ δὲ ἕν.* This is more clearly stated by Ps.-Plut. (Stob. i. p. 22, 16), *Ἔτι δὲ τῇ μονάδι τῶν ἐφεξῆς περισσῶν περιτιθεμένων ὁ γινόμενος ἀεὶ τετράγωνός ἐστι· τῶν δὲ ἀρτίων ὁμοίως περιτιθεμένων ἑτερομήκεις καὶ ἄνισοι πάντες ἀποβαίνουσιν, ἴσως δὲ ἰσάκις οὐδείς.* I cannot feel satisfied with any of the explanations which have been given of the words *καὶ χωρὶς* in the Aristotelian passage (see Zeller, p. 351, n. 2), and I would therefore suggest *ταῖς χώραις*, comparing Boutheros (Stob. i. p. 19, 9), who says, according to the MS. reading, *Καὶ ὁ μὲν (ὁ περισσός), ὁπόταν γεννῶνται ἀνὰ λόγον καὶ πρὸς μονάδας, ταῖς αὐτοῦ χώραις καταλαμβάνει τοὺς ταῖς γραμμαῖς περιεχομένους* (sc. *ἀριθμούς*).

whether he went beyond the oblong, and studied pyramidal or cubic numbers, we cannot say.[1]

Geometry and harmonics.

49. It is easy to see how this way of representing numbers would suggest problems of a geometrical nature. The dots which stand for the pebbles are regularly called "boundary-stones" (ὅροι, *termini*, "terms"), and the area which they occupy, or rather mark out, is the "field" (χώρα).[2] This is evidently a very early way of speaking, and may therefore be referred to Pythagoras himself. Now it must have struck him that "fields" could be compared as well as numbers,[3] and it is even likely that he knew the rough methods of doing this which were traditional in Egypt, though certainly these would fail to satisfy him. Once more the tradition is singularly helpful in suggesting the direction that his thoughts must have taken. He knew, of course, the use of the triangle 3, 4, 5 in constructing right angles. We have seen (p. 24) that it was familiar in the East from a very early date, and that Thales introduced it to the Hellenes, if they did not know it already. In later writers it is actually called the "Pythagorean triangle." Now the Pythagorean proposition *par excellence* is just that, in a right-angled triangle, the square on the hypotenuse is equal

[1] In the fragment referred to above (p. 113, n. 2), Speusippos speaks of four as the first pyramidal number; but this is taken from Philolaos, so we cannot safely ascribe it to Pythagoras.

[2] We have ὅροι of a series (ἔκθεσις), then of a proportion, and in later times of a syllogism. The signs :, ::, and .·. are a survival of the original use. The term χώρα is often used by the later Pythagoreans, though Attic usage required χωρίον for a rectangle. The spaces between the γραμμαί of the *abacus* and the chess-board were also called χῶραι.

[3] In his commentary on Euclid i. 44, Proclus tells us on the authority of Eudemos that the παραβολή, ἔλλειψις, and ὑπερβολή of χωρία were Pythagorean inventions. For an account of these and the subsequent application of the terms in Conic Sections, see Milhaud, *Philosophes géomètres*, pp. 81 sqq.

to the squares on the other two sides, and the so-called Pythagorean triangle is the application of its converse to a particular case. The very name "hypotenuse" affords strong confirmation of the intimate connexion between the two things. It means literally "the cord stretching over against," and this is surely just the rope of the "harpedonapt."[1] An early tradition says that Pythagoras sacrificed an ox when he discovered the proof of this proposition, and indeed it was the real foundation of scientific mathematics.[2]

Incommensurability.

50. One great disappointment, however, awaited Pythagoras. It follows at once from the Pythagorean proposition that the square on the diagonal of a square is double the square on its side, and this ought surely to be capable of numerical expression. As a matter of fact, however, there is no square number which can be divided into two equal square numbers, and so the problem cannot be solved. In this sense, it is doubtless true that Pythagoras discovered the incommensurability of the diagonal and the side of a square, and the proof mentioned by Aristotle, namely, that, if they were commensurable, we should have to say that an even number was equal to an odd number, is distinctly Pythagorean in character.[3] However that may be, it

[1] The verb *ὑποτείνειν* is, of course, used intransitively. The explanation suggested in the text seems to me much simpler than that of Max C. P. Schmidt (*Kultürhistorische Beiträge*, Heft i. pp. 64 sqq.). He explains the hypotenuse as the longest string in a triangular harp; but my view seems more in accordance with analogy. So *ἡ κάθετος* is, literally, a plumb-line.

[2] The statement comes from Eudemos; for it is found in Proclus's commentary on Euclid i. 47. Whether historical or not, it is no Neopythagorean fancy.

[3] Arist. *An. Pr.* A, 23. 41 a 26, *ὅτι ἀσύμμετρος ἡ διάμετρος διὰ τὸ γίγνεσθαι τὰ περιττὰ ἴσα τοῖς ἀρτίοις συμμέτρου τεθείσης*. The proofs given at the end of Euclid's Tenth Book (vol. iii. pp. 408 sqq., Heiberg) turn on this very point. They are not Euclidean, and may be substantially Pythagorean. Cf. Milhaud, *Philosophes géomètres*, p. 94.

is certain that Pythagoras did not care to pursue the subject any further. He had, as it were, stumbled on the fact that the square root of two is a surd, but we know that it was left for Plato's friends, Theodoros of Kyrene and Theaitetos, to give a complete theory of the matter.[1] The fact is that the discovery of the Pythagorean proposition, by giving birth to geometry, had really superseded the old view of quantity as a sum of units; but it was not till Plato's time that the full consequences of this were seen.[2] For the present, the incommensurability of the diagonal and the square remained, as has been said, a "scandalous exception." Our tradition says that Hippasos of Metapontion was drowned at sea for revealing this skeleton in the cupboard.[3]

51. These last considerations show that, while it is quite safe to attribute the substance of the First Book of Euclid to Pythagoras, the arithmetic of Books VII.-IX., and the "geometrical algebra" of Book II. are certainly not his. They operate with lines or with areas instead of with units, and the relations which they establish therefore hold good whether they are capable of numerical expression or not. That is doubtless why arithmetic is not treated in Euclid till after plane geometry, a complete inversion of the original order. For the same reason, the doctrine of proportion which we find in Euclid cannot be Pythagorean, and is

Proportion and harmony.

[1] Plato, *Theaet.* 147 d 3 sqq.

[2] How novel these consequences were, is shown by the fact that in *Laws*, 819 d 5, the Athenian Stranger says that he had only realised them late in life.

[3] This version of the tradition is mentioned in Iamblichos, *V. Pyth.* 247, and looks older than the other, which we shall come to later (§ 148). Hippasos is the *enfant terrible* of Pythagoreanism, and the traditions about him are full of instruction.

indeed the work of Eudoxos. Yet it is clear that the early Pythagoreans, and probably Pythagoras himself, studied proportion in their own way, and that the three "medieties" in particular go back to the founder, especially as the most complicated of them, the "harmonic," stands in close relation to his discovery of the octave. If we take the harmonic proportion 12 : 8 : 6,[1] we find that 12 : 6 is the octave, 12 : 8 the fifth, and 8 : 6 the fourth, and it can hardly be doubted that it was Pythagoras himself who discovered these intervals. The stories which have come down to us about his observing the harmonic intervals in a smithy, and then weighing the hammers that produced them, or of his suspending weights corresponding to those of the hammers to equal strings, are, indeed, impossible and absurd; but it is sheer waste of time to rationalise them.[2] For our purpose their absurdity is their chief merit. They are not stories which any Greek mathematician or musician could possibly have invented, but genuine popular tales bearing witness to the existence of a real tradition that Pythagoras was the author of this momentous discovery.

Things are numbers.

52. It was this too, no doubt, that led Pythagoras to say all things were numbers. We shall see that, at a later date, the Pythagoreans identified these numbers with geometrical figures; but the mere fact that they

[1] Plato (*Tim.* 36 a 3) defines the harmonic mean as *τὴν . . . ταὐτῷ μέρει τῶν ἄκρων αὐτῶν ὑπερέχουσαν καὶ ὑπερεχομένην*. The harmonic mean of 12 and 6 is therefore 8; for $8 = 12 - \frac{12}{3} = 6 + \frac{6}{3}$.

[2] For these stories and a criticism of them, see Max C. P. Schmidt, *Kulturhistorische Beiträge*, i. pp. 78 sqq. The smith's hammers belong to the region of *Märchen*, and it is not true either that the notes would be determined by the weight of the hammers, or that, if they were, the weights hung to equal strings would produce the notes. These inaccuracies were pointed out by Montucla (Martin, *Études sur le Timée*, i. p. 391).

called them "numbers," when taken in connexion with what we are told about the method of Eurytos, is sufficient to show this was not the original sense of the doctrine. It is enough to suppose that Pythagoras reasoned somewhat as follows. If musical sounds can be reduced to numbers, why should not everything else? There are many likenesses to number in things, and it may well be that a lucky experiment, like that by which the octave was discovered, will reveal their true numerical nature. The Neopythagorean writers, going back in this as in other matters to the earliest tradition of the school, indulge their fancy in tracing out analogies between things and numbers in endless variety; but we are fortunately dispensed from following them in these vagaries. Aristotle tells us distinctly that the Pythagoreans explained only a few things by means of numbers,[1] which means that Pythagoras himself left no developed doctrine on the subject, while the Pythagoreans of the fifth century did not care to add anything of the sort to the school tradition. Aristotle does imply, however, that, according to them the "right time" (*καιρός*) was seven, justice was four, and marriage three. These identifications, with a few others like them, we may safely refer to Pythagoras or his immediate successors; but we must not attach much importance to them. They are mere sports of the analogical fancy. If we wish to understand the cosmology of Pythagoras, we must start, not from them, but from any statements we can find that present points of contact with the teaching of the

[1] Arist. *Met.* M, 4. 1078 b 21 (R. P. 78); Zeller, p. 390, n. 2. The *Theologumena Arithmetica*, wrongly attributed to Nikomachos of Gerasa, is full of fanciful doctrine on this subject (R. P. 78 a). Alexander *in Met.* p. 38, 8, gives a few definitions which may be old (R. P. 78 c).

Milesian school. These, we may fairly infer, belong to the system in its most primitive form.

Cosmology. 53. Now the most striking statement of this kind is one of Aristotle's. The Pythagoreans held, he tells us, that there was "boundless breath" outside the heavens, and that it was inhaled by the world.[1] In substance, this is the doctrine of Anaximenes, and it becomes practically certain that it was that of Pythagoras, when we find that Xenophanes denied it.[2] We may infer, then, that the further development of the idea is also due to Pythagoras himself. We are told that, after the first unit had been formed—however that may have taken place—the nearest part of the Boundless was first drawn in and limited;[3] and further, that it is just the Boundless thus inhaled that keeps the units separate from each other.[4] It represents the interval between them. This is a very primitive way of describing the nature of discrete quantity.

In the passages of Aristotle just referred to, the Boundless is also spoken of as the void or empty. This identification of air and the void is a confusion which we have already met with in Anaximenes, and it need not surprise us to find it here too.[5] We find

[1] Arist. *Phys.* Δ, 6. 213 b 22 (R. P. 75).

[2] Diog. ix. 19 (R. P. 103 c). It is true that Diogenes is here drawing from a biographical rather than a doxographical source (*Dox.* p. 168), but this touch can hardly be an invention.

[3] Arist. *Met.* M, 3. 1091 a 13 (R. P. 74).

[4] Arist. *Phys.* Δ, 6. 213 b 23 (R. P. 75 a). The words *διορίζει τὰς φύσεις* have caused unnecessary difficulty, because they have been supposed to attribute the function of limiting to the *ἄπειρον*. Aristotle makes it quite clear that his meaning is that stated in the text. Cf. especially the words *χωρισμοῦ τινος τῶν ἐφεξῆς καὶ διορίσεως*. The term *διωρισμένον* is the proper antithesis to *συνεχές*. In his work on the Pythagorean philosophy, Aristotle used instead the phrase *διορίζει τὰς χώρας* (Stob. i. p. 156, 8; R. P. 75), which is also quite intelligible if we remember what the Pythagoreans meant by *χώρα* (cf. p. 115, n. 2).

[5] Cf. Arist. *Phys.* Δ, 6. 213 a 27, *οἱ δ' ἄνθρωποι . . . φασὶν ἐν ᾧ ὅλως*

also, as we might expect, distinct traces of the other confusion, that of air and vapour. It seems certain, in fact, that Pythagoras identified the Limit with fire, and the Boundless with darkness. We are told by Aristotle that Hippasos made Fire the first principle,[1] and we shall see that Parmenides, in discussing the opinions of his contemporaries, attributes to them the view that there were two primary "forms," Fire and Night.[2] We also find that Light and Darkness appear in the Pythagorean table of opposites under the heads of the Limit and the Unlimited respectively.[3] The identification of breath with darkness here implied is a strong proof of the primitive character of the doctrine; for in the sixth century darkness was supposed to be a sort of vapour, while in the fifth, its true nature was well known. Plato, with his usual historical tact, makes the Pythagorean Timaios describe mist and darkness as condensed air.[4] We must think, then, of a "field" of darkness or breath marked out by luminous units, an imagination which the starry heavens would naturally suggest. It is even probable that we should ascribe to Pythagoras the Milesian view of a plurality of worlds, though it would not have been natural for him to speak of an infinite number. We know, at least, that Petron, one of the early Pythagoreans, said there were just a hundred and eighty-three worlds arranged in a triangle;[5] and Plato makes Timaios

μηδέν ἐστι, τοῦτ' εἶναι κενόν, διὸ τὸ πλῆρες ἀέρος κενὸν εἶναι; *de Part. An.* B, 10. 656 b 15, *τὸ γὰρ κενὸν καλούμενον ἀέρος πλῆρές ἐστι*; *de An.* B, 10. 419 b 34, *δοκεῖ γὰρ εἶναι κενὸν ὁ ἀήρ.*

[1] Arist. *Met.* A, 3. 984 a 7 (R. P. 56 c).

[2] See Chap. IV. § 91.

[3] Arist. *Met.* A, 5. 986 a 25 (R. P. 66).

[4] Plato, *Tim.* 58 d 2.

[5] This is quoted by Plutarch, *de def. orac.* 422 b, d, from Phanias of Eresos, who gave it on the authority of Hippys of Rhegion. If we may

admit, when laying down that there is only one world, that something might be urged in favour of the view that there are five, as there are five regular solids.[1]

The heavenly bodies.

54. Anaximander had regarded the heavenly bodies as wheels of "air" filled with fire which escapes through certain openings (§ 19), and there is evidence that Pythagoras adopted the same view.[2] We have seen that Anaximander only assumed the existence of three such wheels, and held that the wheel of the sun was the lowest. It is extremely probable that Pythagoras identified the intervals between these rings with the three musical intervals which he had discovered, the fourth, the fifth, and the octave. That would be the most natural beginning for the later doctrine of the "harmony of the spheres," though that expression would be doubly misleading if applied to any theory we can properly ascribe to Pythagoras himself. The word *ἁρμονία* does not mean harmony, and the "spheres" are an anachronism. We are still at the stage when wheels or rings were considered sufficient to account for the motions of the heavenly bodies. It is also to be observed that sun, moon, planets, and fixed stars must all be regarded as moving in the same direction from east to west. Pythagoras certainly did not ascribe to the planets an orbital motion of their own from west to east. The old idea was rather that they were left behind more or less every day. As compared with the fixed stars, Saturn is left behind least of all, and the Moon most; so, instead of saying

follow Wilamowitz (*Hermes*, xix. p. 444) in supposing that this really means Hippasos of Metapontion (and it was in Rhegion that the Pythagoreans took refuge), this is a very valuable piece of evidence.

[1] Plato, *Tim.* 55 c 7 sqq.

[2] This will be found in Chap. IV. § 93.

that the Moon took a shorter time than Saturn to complete its path through the signs of the Zodiac, men said Saturn travelled quicker than the Moon, because it more nearly succeeds in keeping up with the signs. Instead of holding that Saturn takes thirty years to complete its revolution, they said it took the fixed stars thirty years to pass Saturn, and only twenty-nine days and a half to pass the Moon. This is one of the most important points to bear in mind regarding the planetary systems of the Greeks, and we shall return to it again.[1]

The account just given of the views of Pythagoras is, no doubt, conjectural and incomplete. We have simply assigned to him those portions of the Pythagorean system which appear to be the oldest, and it has not even been possible at this stage to cite fully the evidence on which our discussion is based. It will only appear in its true light when we have examined the second part of the poem of Parmenides and the system of the later Pythagoreans.[2] For reasons which will then be apparent, I do not venture to ascribe to Pythagoras himself the theory of the earth's revolution round the central fire. It seems safest to suppose that he still adhered to the geocentric hypothesis of Anaximander. In spite of this, however, it will be clear that he opened a new period in the development of Greek science, and it was certainly to his school that its greatest discoveries were directly or indirectly due.

[1] For a clear statement of this view (which was still that of Demokritos), see Lucretius, v. 621 sqq. The view that the planets had an orbital motion from west to east is attributed by Aetios, ii. 16, 3, to Alkmaion (§ 96), which certainly implies that Pythagoras did not hold it. As we shall see (§ 152), it is far from clear that any of the Pythagoreans did. It seems rather to be Plato's discovery.

[2] See Chap. IV. §§ 92-93, and Chap. VII. §§ 150-152.

When Plato deliberately attributes some of his own most important discoveries to the Pythagoreans, he was acknowledging in a characteristic way the debt he owed them.

II. Xenophanes of Kolophon

Life. 55. We have seen how Pythagoras identified himself with the religious movement of his time; we have now to consider a very different manifestation of the reaction against that view of the gods which the poets had made familiar to every one. Xenophanes denied the anthropomorphic gods altogether, but was quite unaffected by the revival of more primitive ideas that was going on all round him. We still have a fragment of an elegy in which he ridiculed Pythagoras and the doctrine of transmigration. "Once, they say, he was passing by when a dog was being ill-treated. 'Stop!' he said, 'don't hit it! It is the soul of a friend! I knew it when I heard its voice.'"[1] We are also told that he opposed the views of Thales and Pythagoras, and attacked Epimenides, which is likely enough, though no fragments of the kind have come down to us.[2] His chief importance lies in the fact that he was the author of the quarrel between philosophy and poetry which culminated in Plato's *Republic*.

It is not easy to determine the date of Xenophanes. Timaios said he was a contemporary of Hieron and Epicharmos, and he certainly seems to have

[1] See fr. 7 (=18 Karst.), *ap.* Diog. viii. 36 (R. P. 88).

[2] Diog. ix. 18 (R. P. 97). We know that Xenophanes referred to the prediction of an eclipse by Thales (Chap. I. p. 41, n. 1). We shall see that his own view of the sun was hardly consistent with the possibility of such a prediction, so it may have been in connexion with this that he opposed him.

played a part in the anecdotical romance of Hieron's court which amused the Greeks of the fourth century much as that of Croesus and the Seven Wise Men amused those of the fifth.[1] As Hieron reigned from 478 to 467 B.C., that would make it impossible to date the birth of Xenophanes much earlier than 570 B.C., even if we suppose him to have lived till the age of a hundred. On the other hand, both Sextus and Clement say that Apollodoros gave Ol. XL. (620-616 B.C.) as the date of his birth, and the former adds that his days were prolonged till the time of Dareios and Cyrus.[2] Again, Diogenes, whose information on such matters mostly comes from Apollodoros, says that he flourished in Ol. LX. (540-537 B.C.), and Diels holds that Apollodoros really said so.[3] However that may be, it is evident that the date 540 B.C. is based on the assumption that he went to Elea in the year of its foundation, and is, therefore, a mere combination.[4]

[1] Timaios *ap.* Clem. *Strom.* i. p. 533 (R. P. 95). There is only one anecdote which actually represents Xenophanes in conversation with Hieron (Plut. *Reg. apophth.* 175 e), but it is natural to understand Arist. *Met.* Γ, 5. 1010 a 4 as an allusion to a remark made by Epicharmos to him. Aristotle has more than one anecdote about Xenophanes, and it seems most likely that he derived them from the romance of which Xenophon's *Hieron* is an echo.

[2] Clem., *loc. cit.*; Sext. *Math.* i. 257. The mention of Cyrus is confirmed by Hipp. *Ref.* i. 94. Diels thinks that Dareios was mentioned first for metrical reasons; but no one has satisfactorily explained why Cyrus should be mentioned at all, unless the early date was intended. On the whole subject, see Jacoby, pp. 204 sqq., who is certainly wrong in supposing that *ἄχρι τῶν Δαρείου καὶ* Κύρου *χρόνων* can mean "during the times of Dareios and Cyrus."

[3] *Rh. Mus.* xxxi. p. 22. He assumes an early corruption of N into M. As Apollodoros gave the Athenian archon, and not the Olympiad, we might with more probability suppose a confusion due to two archons having the same name.

[4] As Elea was founded by the Phokaians six years after they left Phokaia (Herod. i. 164 sqq.) its date is just 540-39 B.C. Cf. the way in which Apollodoros dated Empedokles by the era of Thourioi (§ 98).

What we do know for certain is that Xenophanes had led a wandering life from the age of twenty-five, and that he was still alive and making poetry at the age of ninety-two. He says himself (fr. 8 = 24 Karst.; R. P. 97):—

There are by this time threescore years and seven that have tossed my careworn soul[1] up and down the land of Hellas; and there were then five-and-twenty years from my birth, if I can say aught truly about these matters.

It is tempting to suppose that in this passage Xenophanes was referring to the conquest of Ionia by Harpagos, and that he is, in fact, answering the question asked in another poem[2] (fr. 22 = 17 Karst.; R. P. 95 a):—

This is the sort of thing we should say by the fireside in the winter-time, as we lie on soft couches after a good meal, drinking sweet wine and crunching chickpeas: "Of what country are you, and how old are you, good sir? And how old were you when the Mede appeared?"

We cannot, however, be sure of this, and we must be content with what is, after all, for our purpose the main fact, namely, that he refers to Pythagoras in the past tense, and is in turn so referred to by Herakleitos.[3]

Theophrastos said that Xenophanes had "heard" Anaximander,[4] and we shall see that he was certainly acquainted with the Ionian cosmology. When driven

[1] Bergk (*Litteraturgesch.* ii. p. 418, n. 23) took φροντίς here to mean the literary work of Xenophanes, but it is surely an anachronism to suppose that at this date it could be used like the Latin *cura*.

[2] It was certainly another poem; for it is in hexameters while the preceding fragment is in elegiacs.

[3] Xenophanes, fr. 7 (above, p. 124, n. 1); Herakleitos, frs. 16, 17 (below, p. 147).

[4] Diog. ix. 21 (R. P. 96 a).

from his native city, he lived in Sicily, chiefly, we are told, at Zankle and Katana.[1] Like Archilochos before him, he unburdened his soul in elegies and satires, which he recited at the banquets where, we may suppose, the refugees tried to keep up the usages of good Ionian society. The statement that he was a rhapsode has no foundation at all.[2] The singer of elegies was no professional like the rhapsode, but the social equal of his listeners. In his ninety-second year he was still, we have seen, leading a wandering life, which is hardly consistent with the statement that he settled at Elea and founded a school there, especially if we are to think of him as spending his last days at Hieron's court. It is quite probable that he visited Elea, and it is just possible that he wrote a poem of two thousand hexameters on the foundation of that city, which was naturally a subject of interest to all the Ionic *émigrés*.[3] But it is very remarkable that no ancient writer expressly says that he ever was at Elea, and the only thing besides the doubtful poem referred to which connects him with it is a single anecdote of Aristotle's as to the answer he gave the Eleates when they asked whether they should sacrifice to Leukothea and lament her or not. "If you think her a goddess," he said, "do not

[1] Diog. ix. 18 (R. P. 96). The use of the old name Zankle, instead of the later Messene, points to an early source for this statement—probably the elegies of Xenophanes himself.

[2] Diog. ix. 18 (R. P. 97) says *αὐτὸς ἐρραψῴδει τὰ ἑαυτοῦ*, which is a very different thing. Nothing is said anywhere of his reciting Homer, and the word *ῥαψῳδεῖν* is used quite loosely for "to recite." Gomperz's imaginative picture (*Greek Thinkers*, vol. i. p. 155) has no further support than this single word. Nor is there any trace of Homeric influence in the fragments. They are in the usual elegiac style.

[3] The statement is justly suspected by Hiller (*Rh. Mus.* xxxiii. p. 529) to come from Lobon of Argos, who provided the Seven Wise Men, Epimenides, etc., with stichometric notices, all duly recorded in Diogenes. Even if true, however, it proves nothing.

lament her; if not, do not sacrifice to her." That is absolutely all, and it is only an apophthegm.[1] It is strange there should be no more if Xenophanes had really found a home at last in the Phokaian colony.

Poems. 56. According to a notice preserved in Diogenes, Xenophanes wrote in hexameters and also composed elegies and iambics against Homer and Hesiod.[2] No good authority says anything about his having written a philosophical poem.[3] Simplicius tells us he had never met with the verses about the earth stretching infinitely downwards (fr. 28),[4] and this means that the Academy possessed no copy of such a poem, which would be very strange if it had ever existed. Simplicius was able to find the complete works of much smaller men. Nor does internal evidence lend any support to the view that he wrote a philosophical poem. Diels refers about twenty-eight lines to it, but they would all come in quite as naturally in his attacks on Homer and Hesiod, as I have endeavoured to show. It is also significant that a considerable number of them are derived from com-

[1] Arist. *Rhet.* B, 26. 1400 b 5 (R. P. 98 a). Anecdotes like this are really anonymous. Plutarch transfers the story to Egypt (*P. Ph. Fr.* p. 22, § 13), and others tell it of Herakleitos. It is hardly safe to build on such a foundation.

[2] Diog. ix. 18 (R. P. 97). The word ἐπικόπτων is a reminiscence of Timon, fr. 60; Diels, Ξεινοφάνης ὑπάτυφος Ὁμηραπάτης ἐπικόπτης.

[3] The oldest reference to a poem Περὶ φύσεως is in the Geneva scholium on *Il.* xxi. 196 (quoting fr. 30), and this goes back to Krates of Mallos. We must remember, however, that such titles are of later date than Xenophanes, and he had been given a place among philosophers long before the time of Krates. All we can say, therefore, is that the Pergamene librarians gave the title Περὶ φύσεως to some poem of Xenophanes.

[4] Simpl. *de Caelo*, p. 522, 7 (R. P. 97 b). It is true that two of our fragments (25 and 26) are preserved by Simplicius, but he got them from Alexander. Probably they were quoted by Theophrastos; for it is plain that Alexander had no first-hand knowledge of Xenophanes either. If he had, he would not have been taken in by *M.X.G.* (See p. 138, n. 4.)

mentators on Homer.[1] It seems probable, then, that Xenophanes expressed his theological and philosophical views incidentally in his satires. That would be quite in the manner of the time, as we can see from the remains of Epicharmos.

The satires themselves are called *Silloi* by late writers, and this name may go back to Xenophanes himself. It is also possible, however, that it originates in the fact that Timon of Phleious, the "sillographer" (*c.* 259 B.C.), put much of his satire upon philosophers into the mouth of Xenophanes. Only one iambic line has been preserved, and that is immediately followed by a hexameter (fr. 14 = 5 Karst.). This suggests that Xenophanes inserted iambic lines among his hexameters in the manner of the *Margites*, which would be a very natural thing for him to do.[2]

57. I give all the fragments of any importance according to the text and arrangement of Diels. The fragments.

Elegies

(1)

Now is the floor clean, and the hands and cups of all; one sets twisted garlands on our heads, another hands us fragrant ointment on a salver. The mixing bowls stand ready, full of gladness, and there is more wine at hand that promises never to leave us in the lurch, soft and smelling of flowers in the jars. In the midst the frankincense sends up its holy smoke, and there is cold water, sweet and clean. Brown loaves are set before us and a lordly table laden with cheese and rich honey. The altar in the midst is clustered round with flowers; song and revel fill the halls.

[1] Three fragments (27, 31, 33) come from the *Homeric Allegories*, two (30, 32) are from Homeric scholia.

[2] Cf. Wilamowitz, Progr. Gryphiswald. 1880.

But first it is meet that men should hymn the god with joyful song, with holy tales and pure words; then after libation and prayer made that we may have strength to do right—for that is in truth the better way—no sin is it to drink as much as a man can take and get home without an attendant, so he be not stricken in years. And above all men is he to be praised who after drinking gives goodly proof of himself in the trial of skill, as memory and voice will serve him. Let him not sing of Titans and Giants—those fictions of the men of old—nor of turbulent civil broils in which is no good thing at all; but ever give heedful reverence to the gods.

(2)

What if a man win victory in swiftness of foot, or in the *pentathlon*, at Olympia, where is the precinct of Zeus by Pisa's springs, or in wrestling,—what if by cruel boxing or that fearful sport men call *pankration* he become more glorious in the citizens' eyes, and win a place of honour in the sight of all at the games, his food at the public cost from the State, and a gift to be an heirloom for him,—what if he conquer in the chariot-race,—he will not deserve all this for his portion so much as I do. Far better is our art than the strength of men and of horses! These are but thoughtless judgments, nor is it fitting to set strength before our art. Even if there arise a mighty boxer among a people, or one great in the *pentathlon* or at wrestling, or one excelling in swiftness of foot—and that stands in honour before all tasks of men at the games—the city would be none the better governed for that. It is but little joy a city gets of it if a man conquer at the games by Pisa's banks; it is not this that makes fat the store-houses of a city.

(3)

They learnt dainty and unprofitable ways from the Lydians, so long as they were free from hateful tyranny; they went to the market-place with cloaks of purple dye, not less than a thousand of them all told, vainglorious and proud of their comely tresses, reeking with fragrance from cunning salves.

Satires

(10)

Since all at first have learnt according to Homer. . . .

(11)

Homer and Hesiod have ascribed to the gods all things that are a shame and a disgrace among mortals, stealings and adulteries and deceivings of one another. R. P. 99.

(12)

They have uttered many, many lawless deeds of the gods, stealings and adulteries and deceivings of one another. R. P. *ib.*

(14)

But mortals deem that the gods are begotten as they are, and have clothes[1] like theirs, and voice and form. R. P. 100.

(15)

Yes, and if oxen and horses or lions had hands, and could paint with their hands, and produce works of art as men do, horses would paint the forms of the gods like horses, and oxen like oxen, and make their bodies in the image of their several kinds. R. P. *ib.*

(16)

The Ethiopians make their gods black and snub-nosed; the Thracians say theirs have blue eyes and red hair. R. P. 100 b.

(18)

The gods have not revealed all things to men from the beginning, but by seeking they find in time what is better. R. P. 104 b.

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[1] I formerly, with Zeller, preferred Theodoret's reading *αἴσθησιν*, but both Clement and Eusebios have *ἐσθῆτα*, and Theodoret is entirely dependent on them.

(23)

One god, the greatest among gods and men, neither in form like unto mortals nor in thought. . . . R. P. 100.

(24)

He sees all over, thinks all over, and hears all over. R. P. 102.

(25)

But without toil he swayeth all things by the thought of his mind. R. P. 108 b.

(26)

And he abideth ever in the selfsame place, moving not at all; nor doth it befit him to go about now hither now thither. R. P. 110 a.

(27)

All things come from the earth, and in earth all things end. R. P. 103 a.

(28)

This limit of the earth above is seen at our feet in contact with the air;[1] below it reaches down without a limit. R. P. 103.

(29)

All things are earth and water that come into being and grow. R. P. 103.

(30)

The sea is the source of water and the source of wind; for neither in the clouds (would there be any blasts of wind blowing forth) from within without the mighty sea, nor rivers' streams nor rain-water from the sky. The mighty sea is father of clouds and of winds and of rivers.[2] R. P. 103.

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[1] Reading *ἠέρι* for *καὶ ῥεῖ* with Diels.

[2] This fragment has been recovered in its entirety from the Geneva scholia on Homer (see *Arch.* iv. p. 652). The words in brackets are added by Diels. See also Praechter, "Zu Xenophanes" (*Philol.* xviii. p. 308).

(31)

The sun swinging over[1] the earth and warming it. . . .

(32)

She that they call Iris is a cloud likewise, purple, scarlet and green to behold. R. P. 103.

(33)

For we all are born of earth and water. R. P. *ib.*

(34)

There never was nor will be a man who has certain knowledge about the gods and about all the things I speak of. Even if he should chance to say the complete truth, yet he himself knows not that it is so. But all may have their fancy. R. P. 104.

(35)

Let these be taken as fancies[2] something like the truth. R. P. 104 a.

(36)

All of them[3] that are visible for mortals to behold.

(37)

And in some caves water drips. . . .

(38)

If god had not made brown honey, men would think figs far sweeter than they do.

58. The intention of one of these fragments (fr. 32) is perfectly clear. "Iris too" is a cloud, and we may infer that the same thing had just been said of the sun, The heavenly bodies.

[1] The word is ὑπεριέμενος. This is quoted from the *Allegories* as an explanation of the name Hyperion, and doubtless Xenophanes so meant it.

[2] Reading δεδοξάσθω with Wilamowitz.

[3] As Diels suggests, this probably refers to the stars, which Xenophanes held to be clouds.

moon, and stars; for the doxographers tell us that these were all explained as "clouds ignited by motion."[1] To the same context clearly belongs the explanation of the St. Elmo's fire which Aetios has preserved. "The things like stars which appear on ships," we are told, "which some call the Dioskouroi, are little clouds made luminous by motion."[2] In the doxographers this explanation is repeated with trifling variations under the head of moon, stars, comets, lightning, shooting stars, and so forth, which gives the appearance of a systematic cosmology.[3] But the system is due to the arrangement of the work of Theophrastos, and not to Xenophanes; for it is obvious that a very few hexameters added to those we possess would amply account for the whole doxography.

What we hear of the sun presents some difficulties. We are told, on the one hand, that it too was an ignited cloud; but this can hardly be right. The evaporation of the sea from which clouds arise is distinctly said to be due to the sun's heat. Theophrastos stated that the sun, according to Xenophanes, was a collection of sparks from the moist exhalation; but even this leaves the exhalation itself unexplained.[4] That, however, matters little, if the chief aim of Xenophanes was to discredit the anthropomorphic gods, rather than to give a

[1] Cf. Diels *ad loc.* (*P. Ph. Fr.* p. 44), "ut Sol et cetera astra, quae cum in nebulas evanescerent, deorum simul opinio casura erat." Cf. *Arch.* x. p. 533.

[2] Aet. ii. 18, 1 (*Dox.* p. 347), *Ξενοφάνης τοὺς ἐπὶ τῶν πλοίων φαινομένους οἷον ἀστέρας, οὓς καὶ Διοσκούρους καλοῦσί τινες, νεφέλια εἶναι κατὰ τὴν ποιὰν κίνησιν παραλάμποντα.*

[3] The passages from Aetios are collected in *P. Ph. Fr.* pp. 32 sqq. (*Vors.* p. 42).

[4] Aet. ii. 20, 3 (*Dox.* p. 348), *Ξενοφάνης ἐκ νεφῶν πεπυρωμένων εἶναι τὸν ἥλιον. Θεόφραστος ἐν τοῖς Φυσικοῖς γέγραφεν ἐκ πυριδίων μὲν τῶν συναθροιζομένων ἐκ τῆς ὑγρᾶς ἀναθυμιάσεως, συναθροιζόντων δὲ τὸν ἥλιον.*

scientific theory of the heavenly bodies. The important thing is that Helios too is a temporary phenomenon. The sun does not go round the earth, as Anaximander taught, but straight on, and the appearance of a circular path is solely due to its increasing distance. So it is not the same sun that rises next morning, but a new one altogether; while the old one "tumbles into a hole" when it comes to certain uninhabited regions of the earth. Besides that, there are many suns and moons, one of each for every region of the earth.[1] It is obvious that things of that kind cannot be gods.

The vigorous expression "tumbling into a hole"[2] seems clearly to come from the verses of Xenophanes himself, and there are others of a similar kind, which we must suppose were quoted by Theophrastos. The stars go out in the daytime, but glow again at night "like charcoal embers."[3] The sun is of some use in producing the world and the living creatures in it, but the moon "does no work in the boat."[4] Such expressions can only be meant to make the heavenly bodies appear ridiculous, and it will therefore be well to ask whether the other supposed cosmological fragments can be interpreted on the same principle.

[1] Aet. ii. 24, 9 (*Dox.* p. 355), *πολλοὺς εἶναι ἡλίους καὶ σελήνας κατὰ κλίματα τῆς γῆς καὶ ἀποτομὰς καὶ ζώνας, κατὰ δέ τινα καιρὸν ἐμπίπτειν τὸν δίσκον εἴς τινα ἀποτομὴν τῆς γῆς οὐκ οἰκουμένην ὑφ' ἡμῶν καὶ οὕτως ὥσπερ κενεμβατοῦντα ἔκλειψιν ὑποφαίνειν· ὁ δ' αὐτὸς τὸν ἥλιον εἰς ἄπειρον μὲν προιέναι, δοκεῖν δὲ κυκλεῖσθαι διὰ τὴν ἀπόστασιν.* It is clear that in this notice *ἔκλειψιν* has been erroneously substituted for *δύσιν*, as it has also in Aet. ii. 24, 4 (*Dox.* p. 354).

[2] That this is the meaning of *ὥσπερ κενεμβατοῦντα* appears sufficiently from the passages referred to in Liddell and Scott.

[3] Aet. ii. 13, 14 (*Dox.* p. 343), *ἀναζωπυρεῖν νύκτωρ καθάπερ τοὺς ἄνθρακας.*

[4] Aet. ii. 30, 8 (*Dox.* p. 362), *τὸν μὲν ἥλιον χρήσιμον εἶναι πρὸς τὴν τοῦ κόσμου καὶ τὴν τῶν ἐν αὐτῷ ζῴων γένεσίν τε καὶ διοίκησιν, τὴν δὲ σελήνην παρέλκειν.* The verb *παρέλκειν* means "to cork." Cf. Aristophanes, *Pax*, 1306.

Earth and water.

59. In fr. 29 Xenophanes says that "all things are earth and water," and Hippolytos has preserved the account given by Theophrastos of the context in which this occurred. It was as follows:—

Xenophanes said that a mixture of the earth with the sea is taking place, and that it is being gradually dissolved by the moisture. He says that he has the following proofs of this. Shells are found in midland districts and on hills, and he says that in the quarries at Syracuse has been found the imprint of a fish and of seaweed, at Paros the form of an anchovy in the depth of the stone, and at Malta flat impressions of all marine animals. These, he says, were produced when all things were formerly mud, and the outlines were dried in the mud. All human beings are destroyed when the earth has been carried down into the sea and turned to mud. This change takes place for all the worlds.—Hipp. *Ref.* i. 14 (R.P. 103 a).

This is, of course, the theory of Anaximander, and we may perhaps credit him rather than Xenophanes with the observations of fossils.[1] Most remarkable of all, however, is the statement that this change applies to "all the worlds." It really seems impossible to doubt that Theophrastos attributed a belief in "innumerable worlds" to Xenophanes. As we have seen already, Aetios includes him in his list of those who held this doctrine, and Diogenes ascribes it to him also.[2] In this place, Hippolytos seems to take it for granted.

[1] There is an interesting note on these in Gomperz's *Greek Thinkers* (Eng. trans. i. p. 551). I have translated his conjecture *φυκῶν* instead of the MS. *φωκῶν*, as this is said to involve a palæontological impossibility, and impressions of fucoids are found, not indeed in the quarries of Syracuse, but near them. It is said also that there are no fossils in Paros, so the anchovy must have been an imaginary one.

[2] Aet. ii. 1, 2 (*Dox*, p. 327); Diog. ix. 19 (R. P. 103 c). It is true, of course, that this passage of Diogenes comes from the biographical compendium (*Dox*. p. 168); but, for all that, it is a serious matter to deny the Theophrastean origin of a statement found in Aetios, Hippolytos, and Diogenes.

We shall also find, however, that in another connexion he said the World or God was one. If our interpretation of him is correct, there is no difficulty here. The main point is that, so far from being a primeval goddess, and "a sure seat for all things ever," Gaia too is a passing appearance. That belongs to the attack upon Hesiod, and, if in this connexion Xenophanes spoke, with Anaximander, of "innumerable worlds," while elsewhere he said that God or the World was one, that is probably connected with a still better attested contradiction which we have now to examine.

60. Aristotle tried without success to discover from the poems of Xenophanes whether he regarded the world as finite or infinite. "He made no clear pronouncement on the subject," he tells us.[1] Theophrastos, on the other hand, decided that he regarded it as spherical and finite because he said it was "equal every way."[2] This, however, leads to very serious difficulties. We have seen already that Xenophanes said the sun went right on to infinity, and this agrees with his view of the earth as an infinitely extended plain. Still more difficult to reconcile with the idea of a spherical and finite world is the statement of fr. 28 that, while the earth has an upper limit which we see, it has no limit below. This is attested by Aristotle, who speaks of the earth being "infinitely rooted," and adds that Empedokles criticised Xenophanes for holding this

Finite or infinite?

[1] Arist. *Met.* A, 5. 986 b 23 (R. P. 101), *οὐδὲν διεσαφήνισεν*.

[2] This is given as an inference by Simpl. *Phys.* p. 23, 18 (R. P. 108 b), *διὰ τὸ πανταχόθεν ὅμοιον*. It does not merely come from *M.X.G.* (R. P. 108), *πάντῃ δ' ὅμοιον ὄντα σφαιροειδῆ εἶναι*. Hippolytos has it too (*Ref.* i. 14; R. P. 102 a), so it goes back to Theophrastos. Timon of Phleious understood Xenophanes in the same way; for he makes him call the One *ἴσον ἁπάντῃ* (fr. 60, Diels = 40 Wachsm.; R. P. 102 a).

view.[1] It further appears from the fragment of Empedokles quoted by Aristotle that Xenophanes said the vast Air extended infinitely upwards.[2] We are therefore bound to try to find room for an infinite earth and an infinite air in a spherical and finite world! That comes of trying to find science in satire. If, on the other hand, we regard these statements from the same point of view as those about the heavenly bodies, we shall at once see what they most probably mean. The story of Ouranos and Gaia was always the chief scandal of the *Theogony*, and the infinite air gets rid of Ouranos altogether. As to the earth stretching infinitely downwards, that gets rid of Tartaros, which Homer described as situated at the bottommost limit of earth and sea, as far beneath Hades as heaven is above the earth.[3] This is pure conjecture, of course; but, if it is even possible, we are entitled to disbelieve that such startling contradictions occurred in a cosmological poem.

A more subtle explanation of the difficulty commended itself to the late Peripatetic who wrote an account of the Eleatic school, part of which is still extant in the Aristotelian corpus, and is generally known now as the treatise on *Melissos, Xenophanes, and Gorgias*.[4] He said that Xenophanes declared the

[1] Arist. *de Caelo*, B, 13. 294 a 21 (R. P. 103 b).

[2] I take δαψιλὸς as an attribute and ἀπείρονα as predicate to both subjects.

[3] *Il.* viii. 13-16, 478-481, especially the words οὐδ' εἴ κε τὰ νείατα πείραθ' ἵκηαι | γαίης καὶ πόντοιο κ.τ.λ. *Iliad* viii. must have seemed a particularly bad book to Xenophanes.

[4] In Bekker's edition this treatise bears the title Περὶ Ξενοφάνους, περὶ Ζήνωνος, περὶ Γοργίου, but the best MS. gives as the titles of its three sections: (1) Περὶ Ζήνωνος, (2) Περὶ Ξενοφάνους, (3) Περὶ Γοργίου. The first section, however, plainly refers to Melissos, so the whole treatise is now entitled *De Melisso, Xenophane, Gorgia* (*M.X.G.*). It has been edited by Apelt in the Teubner Series, and more recently by Diels (*Abh.*

world to be neither finite nor infinite, and he composed a series of arguments in support of this thesis, to which he added another like it, namely, that the world is neither in motion nor at rest. This has introduced endless confusion into our sources. Alexander used this treatise as well as the great work of Theophrastos, and Simplicius supposed the quotations from it to be from Theophrastos too. Having no copy of the poems he was completely baffled, and until recently all accounts of Xenophanes were vitiated by the same confusion. It may even be suggested that, but for this, we should have heard very little of the "philosophy of Xenophanes," a way of speaking which is in the main a survival from the days before this scholastic exercise was recognised as having no authority.

61. In the passage of the *Metaphysics* just referred to, Aristotle speaks of Xenophanes as "the first partisan of the One,"[1] and the context shows that he means to suggest he was the first of the Eleatics. We have seen already that the certain facts of his life make it very unlikely that he settled at Elea and founded a school there, and it is probable that, as usual in such cases, Aristotle is simply reproducing — God and the world.

der k. Preuss. Akad. 1900), who has also given the section dealing with Xenophanes in *P. Ph. Fr.* pp. 24-29 (*Vors.* pp. 36 sqq.). He has now withdrawn the view maintained in *Dox.* p. 108 that the work belongs to the third century B.C., and holds that it was *a Peripatetico eclectico* (*i.e. sceptica, platonica, stoica admiscente*) *circa Christi natalem conscriptum*. If that is so, there is no reason to doubt, as I formerly did, that the second section is really meant to deal with Xenophanes. The writer would have no first-hand knowledge of his poems, and the order in which the philosophers are discussed is that of the passage in the *Metaphysics* which suggested the whole thing. It is possible that a section on Parmenides preceded what we now have.

[1] *Met.* A, 5. 986 b 21 (R. P. 101), πρῶτος τούτων ἑνίσας. The verb ἑνίζειν occurs nowhere else, but is plainly formed on the analogy of μηδίζειν, φιλιππίζειν, and the like. It is not likely that it means "to unify." Aristotle could easily have said ἑνώσας if he had meant that.

certain statements of Plato. At any rate, Plato had spoken of the Eleatics as the "partisans of the Whole,"[1] and he had also spoken of the school as "starting with Xenophanes and even earlier."[2] The last words, however, show clearly enough what he meant. Just as he called the Herakleiteans "followers of Homer and still more ancient teachers,"[3] so he attached the Eleatic school to Xenophanes and still earlier authorities. We have seen in other instances how these playful and ironical remarks of Plato were taken seriously by his successors, and we need not let this fresh instance of the same thing influence our general view of Xenophanes unduly.

Aristotle goes on to tell us that Xenophanes, "referring to the whole world,[4] said the One was god." This clearly alludes to frs. 23-26, where all human attributes are denied of a god who is said to be one and "the greatest among gods and men." It may be added that these verses gain very much in point if we may think of them as closely connected with frs.

[1] *Tht.* 181 a 6, τοῦ ὅλου στασιῶται. The noun στασιώτης has no other meaning than "partisan." There is no verb στασιοῦν "to make stationary," and such a formation would be against all analogy. The derivation στασιώτας . . . ἀπὸ τῆς στάσεως appears first in Sext. *Math.* x. 46, from which passage we may infer that Aristotle used the word, not that he gave the derivation.

[2] *Soph.* 242 d 5 (R. P. 101 b). If the passage implies that Xenophanes settled at Elea, it equally implies this of his predecessors. But Elea was not founded till Xenophanes was in the prime of life.

[3] *Tht.* 179 e 3, τῶν Ἡρακλειτείων ἤ, ὥσπερ σὺ λέγεις, Ὁμηρείων καὶ ἔτι παλαιοτέρων. In this passage, Homer stands to the Herakleiteans in exactly the same relation as Xenophanes does to the Eleatics in the *Sophist*.

[4] *Met.* 981 b 24. The words cannot mean "gazing up at the whole heavens," or anything of that sort. They are taken as I take them by Bonitz (*im Hinblicke auf den ganzen Himmel*) and Zeller (*im Hinblick auf das Weltganze*). The word ἀποβλέπειν had become much too colourless to bear the other meaning, and οὐρανός, as we know, means what was later called κόσμος.

11-16, instead of referring the one set of verses to the Satires and the other to a cosmological poem. It was probably in the same context that Xenophanes called the world or god "equal every way"[1] and denied that it breathed.[2] The statement that there is no mastership among the gods[3] also goes very well with fr. 26. A god has no wants, nor is it fitting for one god to be the servant of others, like Iris and Hermes in Homer.

Monotheism or polytheism.

62. That this "god" is just the world, Aristotle tells us, and the use of the word *θεός* is quite in accordance with Anaximander's. Xenophanes regarded it as sentient, though without any special organs of sense, and it sways all things by the thought of its mind. He also calls it "one god," and, if that is monotheism, then Xenophanes was a monotheist, though this is surely not how the word is generally understood. The fact is that the expression "one god" wakens all sorts of associations in our mind which did not exist at all for the Greeks of this time. His contemporaries would have been more likely to call Xenophanes an atheist than anything else. As Eduard Meyer excellently says: "In Greece the question of one god or gods many hardly plays any part. Whether the divine power is thought of as a unity or a plurality, is irrelevant in comparison with the question whether it exists at all, and how its nature and its relation to the world is to be understood."[4]

[1] See above, p. 137, n. 2.

[2] Diog. ix. 19 (R. P. 103 c), *οὖλον δ' ὁρᾶν καὶ οὖλον ἀκούειν, μὴ μέντοι ἀναπνεῖν*. See above, p. 120, n. 2.

[3] [Plut.] *Strom.* fr. 4, *ἀποφαίνεται δὲ καὶ περὶ θεῶν ὡς οὐδεμιᾶς ἡγεμονίας ἐν αὐτοῖς οὔσης· οὐ γὰρ ὅσιον δεσπόζεσθαί τινα τῶν θεῶν, ἐπιδεῖσθαί τε μηδενὸς αὐτῶν μηδένα μηδ' ὅλως, ἀκούειν δὲ καὶ ὁρᾶν καθόλου καὶ μὴ κατὰ μέρος.*

[4] *Gesch. des Alterth.* ii. § 466.

On the other hand, it is wrong to say with Freudenthal that Xenophanes was in any sense a polytheist.[1] That he should use the language of polytheism in his elegies is only what we should expect, and the other references to "gods" can be best explained as incidental to his attack on the anthropomorphic gods of Homer and Hesiod. In one case, Freudenthal has pressed a proverbial way of speaking too hard.[2] Least of all can we admit that Xenophanes allowed the existence of subordinate or departmental gods; for it was just the existence of such that he was chiefly concerned to deny. At the same time, I cannot help thinking that Freudenthal was more nearly right than Wilamowitz, who says that Xenophanes "upheld the only real monotheism that has ever existed upon earth."[3] Diels, I fancy, comes nearer the mark, when he calls it a "somewhat narrow pantheism."[4] But all these views would have surprised Xenophanes himself about equally. He was really Goethe's *Weltkind*, with prophets to right and left of him, and he would have smiled if he had known that one day he was to be regarded as a theologian.

[1] Freudenthal, *Die Theologie des Xenophanes*.

[2] Xenophanes calls his god "greatest among gods and men," but this is simply a case of "polar expression," to which parallels will be found in Wilamowitz's note to the *Herakles*, v. 1106. Cf. especially the statement of Herakleitos (fr. 20) that "no one of gods or men" made the world.

[3] *Griechische Literatur*, p. 38.

[4] *Parmenides Lehrgedicht*, p. 9.

CHAPTER III

HERAKLEITOS OF EPHESOS

63. HERAKLEITOS of Ephesos, son of Blyson, is said to have "flourished" in Ol. LXIX. (504/3-501/0 B.C.);[1] that is to say, just in the middle of the reign of Dareios, with whom several traditions connected him.[2] We shall see that Parmenides was assigned to the same Olympiad, though for another reason (§ 84). It is more important, however, for our purpose to notice that, while Herakleitos refers to Pythagoras and Xenophanes by name and in the past tense (fr. 16), he is in turn referred to by Parmenides (fr. 6). These references are sufficient to mark his proper place in the history of philosophy. Zeller holds, indeed, that he cannot have published his work till after 478 B.C., on the ground that the expulsion of his friend Hermodoros, alluded to in fr. 114, could not have taken place before the downfall of Persian rule. If that were so, it might be hard to see how Parmenides could have known the views of Herakleitos; but there is surely no difficulty in supposing that the Ephesians may have sent one of their foremost citizens into banishment at a time when they were still paying

Life of Herakleitos.

[1] Diog. ix. 1 (R. P. 29), no doubt from Apollodoros through some intermediate authority. Jacoby, pp. 227 sqq.

[2] Bernays, *Die Herakleitischen Briefe*, pp. 13 sqq.

tribute to the Great King. The Persians never took their internal self-government from the Ionian cities, and the spurious *Letters* of Herakleitos show the accepted view was that the expulsion of Hermodoros took place during the reign of Dareios.[1]

Sotion said that Herakleitos was a disciple of Xenophanes,[2] which is not probable; for Xenophanes seems to have left Ionia for ever before Herakleitos was born. More likely he was not a disciple of any one; but it is clear, at the same time, that he was acquainted both with the Milesian cosmology and with the poems of Xenophanes. He also knew something of the theories taught by Pythagoras (fr. 17).

Of the life of Herakleitos we really know nothing, except, perhaps, that he belonged to the ancient royal house and resigned the nominal position of Basileus in favour of his brother.[3] The origin of the other statements bearing on it is quite transparent.[4]

His book. 64. We do not know the title of the work of Herakleitos[5]—if, indeed, it had one at all—and it

[1] Bernays, *op. cit.* pp. 20 sqq.

[2] Sotion *ap.* Diog. ix. 5 (R. P. 29 c).

[3] Diog. ix. 6 (R. P. 31).

[4] See Patin, *Heraklits Einheitslehre*, pp. 3 sqq. Herakleitos said (fr. 68) that it was death to souls to become water; and we are told accordingly that he died of dropsy. He said (fr. 114) that the Ephesians should leave their city to their children, and (fr. 79) that Time was a child playing draughts. We are therefore told that he refused to take any part in public life, and went to play with the children in the temple of Artemis. He said (fr. 85) that corpses were more fit to be cast out than dung; and we are told that he covered himself with dung when attacked with dropsy. Lastly, he is said to have argued at great length with his doctors because of fr. 58. For these tales see Diog. ix. 3-5, and compare the stories about Empedokles discussed in Chap. V. § 100.

[5] The variety of titles enumerated in Diog. ix. 12 (R. P. 30 b) seems to show that none was authentically known. That of "Muses" comes from Plato, *Soph.* 242 d 7. The others are mere "mottoes" (Schuster) prefixed

is not very easy to form a clear idea of its contents. We are told that it was divided into three discourses: one dealing with the universe, one political, and one theological.[1] It is not likely that this division is due to Herakleitos himself; all we can infer from the statement is that the work fell naturally into these three parts when the Stoic commentators took their editions of it in hand.

The style of Herakleitos is proverbially obscure, and, at a later date, got him the nickname of "the Dark."[2] Now the fragments about the Delphic god and the Sibyl (frs. 11 and 12) seem to show that he was quite conscious of writing an oracular style, and we have to ask why he did so. In the first place, it was the manner of the time.[3] The stirring events of the age, and the influence of the religious revival, gave something of a prophetic tone to all the leaders of thought. Pindar and Aischylos have it too. They all feel that they are in some measure inspired. It is also the age of great individualities, who are apt to be solitary and disdainful. Herakleitos at least was so. If men cared to dig for the gold they might find it (fr. 8); if not, they must be content with straw (fr. 51). This seems to have been the view taken by Theophrastos, who said that the headstrong temperament of Herakleitos sometimes led him into incompleteness and inconsistencies of statement.[4] But that is

by Stoic editors, and intended to emphasise their view that the subject of the work was ethical or political (Diog. ix. 15; R. P. 30 c).

[1] Diog. ix. 5 (R. P. 30). Bywater has followed this hint in his arrangement of the fragments. The three sections are 1-90, 91-97, 98-130.

[2] R. P. 30 a. The epithet ὁ σκοτεινός is of late date, but Timon of Phleious already called him αἰνικτής (fr. 43, Diels).

[3] See the valuable observations of Diels in the Introduction to his *Herakleitos von Ephesos*, pp. iv. sqq.

[4] Cf. Diog. ix. 6 (R. P. 31).

a very different thing from studied obscurity and the *disciplina arcani* sometimes attributed to him; if Herakleitos does not go out of his way to make his meaning clear, neither does he hide it (fr. 11).

The fragments.

65. I give a version of the fragments according to the arrangement of Mr. Bywater's exemplary edition.[1]

(1) It is wise to hearken, not to me, but to my Word, and to confess that all things are one.[2] R. P. 40.

(2) Though this Word[3] is true evermore, yet men are as unable to understand it when they hear it for the first time as before they have heard it at all. For, though all things come to pass in accordance with this Word, men seem as if they had no experience of them, when they make trial of words and deeds such as I set forth, dividing each thing according to its nature and showing how it truly is. But other men know not what they are doing when awake, even as they forget what they do in sleep. R. P. 32.

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[1] In his edition, Diels has given up all attempt to arrange the fragments according to subject, and this makes his text unsuitable for our purpose. I think, too, that he overestimates the difficulty of an approximate arrangement, and makes too much of the view that the style of Herakleitos was "aphoristic." That it was so, is an important and valuable remark; but it does not follow that Herakleitos wrote like Nietzsche. For a Greek, however prophetic in his tone, there must always be a distinction between an aphoristic and an incoherent style. See the excellent remarks of Lortzing in *Berl. Phil. Wochenschr.* 1896, pp. 1 sqq.

[2] Both Bywater and Diels accept Bergk's *λόγου* for *δόγματος* and Miller's *εἶναι* for *εἰδέναι*. Cf. Philo, *leg. all.* iii. c, quoted in Bywater's note.

[3] The *λόγος* is simply the discourse of Herakleitos himself; though, as he is a prophet, we may call it "the Word." It can neither mean a discourse addressed to Herakleitos nor yet "reason." (Cf. Zeller, p. 630, n. 1; Eng. trans. ii. p. 7, n. 2.) A difficulty has been raised about the words *ἐόντος αἰεί*. How could Herakleitos say that his discourse had always existed? The answer is that in Ionic *ἐών* means "true" when coupled with words like *λόγος*. Cf. Herod. i. 30, *τῷ ἐόντι χρησάμενος λέγει*; and even Aristoph. *Frogs*, 1052, *οὐκ ὄντα λόγον*. It is only by taking the words in this way that we can understand Aristotle's hesitation as to the proper punctuation of the fragment (*Rhet.* Γ 5. 1407 b 15; R. P. 30 a). The Stoic interpretation given by Marcus Aurelius, iv. 46 (R. P. 32 b), must be rejected altogether. The word *λόγος* was never used like that till post-Aristotelian times.

(3) Fools when they do hear are like the deaf: of them does the saying bear witness that they are absent when present. R. P. 31 a.

(4) Eyes and ears are bad witnesses to men if they have souls that understand not their language. R. P. 42.

(5) The many do not take heed of such things as those they meet with, nor do they mark them when they are taught, though they think they do.

(6) Knowing not how to listen nor how to speak.

(7) If you do not expect the unexpected, you will not find it; for it is hard to be sought out and difficult.[1]

(8) Those who seek for gold dig up much earth and find a little. R. P. 44 b.

(10) Nature loves to hide. R. P. 34 f.

(11) The lord whose is the oracle at Delphoi neither utters nor hides his meaning, but shows it by a sign. R. P. 30 a.

(12) And the Sibyl, with raving lips uttering things mirthless, unbedizened, and unperfumed, reaches over a thousand years with her voice, thanks to the god in her. R. P. 30 a.

(13) The things that can be seen, heard, and learned are what I prize the most. R. P. 42.

(14) . . . bringing untrustworthy witnesses in support of disputed points.

(15) The eyes are more exact witnesses than the ears.[2] R. P. 42 c.

(16) The learning of many things teacheth not understanding, else would it have taught Hesiod and Pythagoras, and again Xenophanes and Hekataios. R. P. 31.

(17) Pythagoras, son of Mnesarchos, practised inquiry beyond all other men, and choosing out these writings, claimed for his own wisdom what was but a knowledge of many things and an art of mischief.[3] R. P. 31 a.

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[1] I have departed from the punctuation of Bywater here, and supplied a fresh object to the verb as suggested by Gomperz (*Arch.* i. 100).

[2] Cf. Herod. i. 8. The application is, no doubt, the same as that of the last two fragments. Personal inquiry is better than tradition.

[3] See Chap. II. p. 107, n. 1. The best attested reading is ἐποιήσατο, not ἐποίησεν, and ἐποιήσατο ἑαυτοῦ means "claimed as his own." The words ἐκλεξάμενος ταύτας τὰς συγγραφάς have been doubted since the time of Schleiermacher, and Diels has now come to regard the whole fragment as

(18) Of all whose discourses I have heard, there is not one who attains to understanding that wisdom is apart from all. R. P. 32 b.

(19) Wisdom is one thing. It is to know the thought by which all things are steered through all things. R. P. 40.

(20) This world,[1] which is the same for all, no one of gods or men has made; but it was ever, is now, and ever shall be an ever-living Fire, with measures kindling, and measures going out. R. P. 35.[2]

(21) The transformations of Fire are, first of all, sea; and half of the sea is earth, half whirlwind.[3] . . . R. P. 35 b.

(22) All things are an exchange for Fire, and Fire for all things, even as wares for gold and gold for wares. R. P. 35.

(23) It becomes liquid sea, and is measured by the same tale as before it became earth.[4] R. P. 39.

(24) Fire is want and surfeit. R. P. 36 a.

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spurious. This is because it was used to prove that Pythagoras wrote books (cf. Diels, *Arch.* iii. p. 451). As Mr. Bywater has pointed out, however, the fragment itself makes no such statement; it only says that he read books, which we may presume he did. I would further suggest that the old-fashioned *συγγραφάς* is rather too good for a forger, and that the omission of the very thing to be proved is remarkable. The last suggestion of a book by Pythagoras disappears with the reading *ἐποιήσατο* for *ἐποίησεν*. Of course a late writer who read of Pythagoras making extracts from books would assume that he put them into a book of his own, just as people did in his own days. For the rest, I understand *ἱστορίη* of science, which is contrasted with the *κακοτεχνίη* which Pythagoras derived from the *συγγραφαί* of men like Pherekydes of Syros.

[1] The word *κόσμος* must mean "world" here, not merely "order"; for only the world could be identified with fire. This use of the word is Pythagorean, and there is no reason to doubt that Herakleitos may have known it.

[2] It is important to notice that *μέτρα* is internal accusative with *ἁπτόμενον*, "with its measures kindling and its measures going out."

[3] On the word *πρηστήρ*, see below, p. 165, n. 2.

[4] The subject of fr. 23 is *γῆ*, as we see from Diog. ix. 9 (R. P. 36), *πάλιν τε αὖ τὴν γῆν χεῖσθαι*; and Aet. i. 3, 11 (*Dox.* p. 284 a 1; b 5), *ἔπειτα ἀναχαλωμένην τὴν γῆν ὑπὸ τοῦ πυρὸς χύσει* (Dübner: *φύσει, libri*) *ὕδωρ ἀποτελεῖσθαι.* Herakleitos might quite well say *γῆ θάλασσα διαχέεται*, and the context in Clement (*Strom.* v. p. 712) seems to imply this. The phrase *μετρέεται εἰς τὸν αὐτὸν λόγον* can only mean that the proportion of the measures remains constant. So practically Zeller (p. 690, n. 1), *zu derselben Grösse.*

(25) Fire lives the death of air,[1] and air lives the death of fire; water lives the death of earth, earth that of water. R. P. 37.

(26) Fire in its advance will judge and convict[2] all things. R. P. 36 a.

(27) How can one hide from that which never sets?

(28) It is the thunderbolt that steers the course of all things. R. P. 35 b.

(29) The sun will not overstep his measures; if he does, the Erinyes, the handmaids of Justice, will find him out. R. P. 39.

(30) The limit of East and West is the Bear; and opposite the Bear is the boundary of bright Zeus.[3]

(31) If there were no sun it would be night, for all the other stars could do.[4]

(32) The sun is new every day.

(33) See above, Chap. I. p. 41, n. 1.

(34) . . . the seasons that bring all things.

(35) Hesiod is most men's teacher. Men think he knew very many things, a man who did not know day or night! They are one.[5] R. P. 39 b.

(36) God is day and night, winter and summer, war and peace, surfeit and hunger; but he takes various shapes, just as fire,[6] when it is mingled with spices, is named according to the savour of each. R. P. 39 b.

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[1] With Diels I adopt the transposition (proposed by Tocco) of *ἀέρος* and *γῆς*.

[2] I understand *ἐπελθόν* of the *πυρὸς ἔφοδος*, for which see below, p. 168. Diels has pointed out that *καταλαμβάνειν* is the old word for "to convict." It is, literally, "to overtake," just as *αἱρεῖν* is "to catch."

[3] In this fragment it is clear that *οὖρος = τέρματα*, and therefore means "boundary," not "hill." As *αἴθριος Ζεύς* means the bright blue sky, I do not think its *οὖρος* can be the South Pole, as Diels says. It is more likely the horizon. I am inclined to take the fragment as a protest against the Pythagorean theory of a southern hemisphere.

[4] We learn from Diog. ix. 10 (quoted below, p. 164) that Herakleitos explained why the sun was warmer and brighter than the moon, and this is doubtless a fragment of that passage. I now think the words *ἕνεκα τῶν ἄλλων ἄστρων* are from Herakleitos. So Diels.

[5] Hesiod said Day was the child of Night (*Theog.* 124).

[6] Reading *ὅκωσπερ πῦρ* for *ὅκωσπερ* with Diels.

(37) If all things were turned to smoke, the nostrils would distinguish them.

(38) Souls smell in Hades. R. P. 46 d.

(39) Cold things become warm, and what is warm cools; what is wet dries, and the parched is moisted.

(40) It scatters and it gathers; it advances and retires.

(41, 42) You cannot step twice into the same rivers; for fresh waters are ever flowing in upon you. R. P. 33.

(43) Homer was wrong in saying: "Would that strife might perish from among gods and men!" He did not see that he was praying for the destruction of the universe; for, if his prayer were heard, all things would pass away.[1] . . . R. P. 34 d.

(44) War is the father of all and the king of all; and some he has made gods and some men, some bond and some free. R. P. 34.

(45) Men do not know how what is at variance agrees with itself. It is an attunement of opposite tensions,[2] like that of the bow and the lyre. R. P. 34.

(46) It is the opposite which is good for us.[3]

(47) The hidden attunement is better than the open. R. P. 34.

(48) Let us not conjecture at random about the greatest things.

(49) Men that love wisdom must be acquainted with very many things indeed.

(50) The straight and the crooked path of the fuller's comb is one and the same.

(51) Asses would rather have straw than gold. R. P. 31 a.

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[1] *Il.* xviii. 107. I add the words *οἰχήσεσθαι γὰρ πάντα* from Simpl. *in Cat.* (88 b 30 schol. Br.). They seem to me at least to represent something that was in the original.

[2] I cannot think it likely that Herakleitos said both *παλίντονος* and *παλίντροπος ἁρμονίη*, and I prefer Plutarch's *παλίντονος* (R. P. 34 b) to the *παλίντροπος* of Hippolytos. Diels thinks that the polemic of Parmenides decides the question in favour of *παλίντροπος*; but see below, p. 184, n. 1, and Chap. IV. p. 198, n. 4.

[3] This, I now think, is the medical rule *αἱ δ' ἰατρεῖαι διὰ τῶν ἐναντίων*, *e.g.* *βοηθεῖν τῷ θερμῷ ἐπὶ τὸ ψυχρόν* (Stewart on Arist. *Eth.* 1104 b 16).

(51*a*) Oxen are happy when they find bitter vetches to eat.[1] R. P. 48 b.

(52) The sea is the purest and the impurest water. Fish can drink it, and it is good for them; to men it is undrinkable and destructive. R. P. 47 c.

(53) Swine wash in the mire, and barnyard fowls in dust.

(54) . . . to delight in the mire.

(55) Every beast is driven to pasture with blows.[2]

(56) Same as 45.

(57) Good and ill are one. R. P. 47 c.

(58) Physicians who cut, burn, stab, and rack the sick, demand a fee for it which they do not deserve to get. R. P. 47 c.[3]

(59) Couples are things whole and things not whole, what is drawn together and what is drawn asunder, the harmonious and the discordant. The one is made up of all things, and all things issue from the one.[4]

(60) Men would not have known the name of justice if these things were not.[5]

(61) To God all things are fair and good and right, but men hold some things wrong and some right. R. P. 45.

(62) We must know that war is common to all and strife is justice, and that all things come into being and pass away (?) through strife.

(64) All the things we see when awake are death, even as all we see in slumber are sleep. R. P. 42 c.[6]

(65) The wise is one only. It is unwilling and willing to be called by the name of Zeus. R. P. 40.

(66) The bow (*βιός*) is called life (*βίος*), but its work is death. R. P. 49 a.

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[1] Fr. 51*a* was recovered by Bywater from Albertus Magnus. See *Journ. Phil.* ix. p. 230.

[2] On fr. 55 see Diels in *Berl. Sitzb.* 1901, p. 188.

[3] I now read *ἐπαιτέονται* with Bernays and Diels.

[4] On fr. 59 see Diels in *Berl. Sitzb.* 1901, p. 188. The reading *συνάψιες* seems to be well attested and gives an excellent sense. It is not, however, correct to say that the optative could not be used in an imperative sense.

[5] By "these things," he probably meant all kinds of injustice.

[6] Diels supposes that fr. 64 went on *ὀκόσα δὲ τεθνηκότες ζωή*. "Life, Sleep, Death is the threefold ladder in psychology, as in physics Fire, Water, Earth."

(67) Mortals are immortals and immortals are mortals, the one living the others' death and dying the others' life. R. P. 46.

(68) For it is death to souls to become water, and death to water to become earth. But water comes from earth; and from water, soul. R. P. 38.

(69) The way up and the way down is one and the same. R. P. 36 d.

(70) In the circumference of a circle the beginning and end are common.

(71) You will not find the boundaries of soul by travelling in any direction, so deep is the measure of it.[1] R. P. 41 d.

(72) It is pleasure to souls to become moist. R. P. 46 c.

(73) A man, when he gets drunk, is led by a beardless lad, tripping, knowing not where he steps, having his soul moist. R. P. 42.

(74-76) The dry soul is the wisest and best.[2] R. P. 42.

(77) Man is kindled and put out like a light in the night-time.

(78) And it is the same thing in us that is quick and dead, awake and asleep, young and old; the former are shifted[3] and

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[1] I think now with Diels that the words *οὔτω βαθὺν λόγον ἔχει* are probably genuine. They present no difficulty if we remember that *λόγος* means "measurement," as in fr. 23.

[2] This fragment is interesting because of the great antiquity of the corruptions which it has suffered. According to Stephanus, who is followed by Bywater and Diels, we should read: *Αὔη ψυχὴ σοφωτάτη καὶ ἀρίστη*, *ξηρή* (or rather *ξηρά*—the Ionic form would only appear when the word got into the text) being a mere gloss upon the somewhat unusual *αὔη*. When once *ξηρή* got into the text, *αὔη* became *αὐγή*, and we get the sentence: "the dry light is the wisest soul," whence the *siccum lumen* of Bacon. Now this reading is certainly as old as Plutarch, who, in his Life of Romulus (c. 28), takes *αὐγή* to mean lightning, as it sometimes does, and supposes the idea to be that the wise soul bursts through the prison of the body like dry lightning (whatever that may be) through a cloud. I do not think that Clement's making the same mistake proves anything at all (Zeller, p. 705, n. 3; Eng. trans. i. p. 80, n. 2), except that he had read his Plutarch. Lastly, it is worth noticing that, though Plutarch must have written *αὐγή*, the MSS. vary between *αὔτη* and *αὐτή*. The next stage is the corruption of the corrupt *αὐγή* into *οὗ γῆ*. This yields the sentiment that "where the earth is dry, the soul is wisest," and is as old as Philo (see Mr. Bywater's notes).

[3] I understand *μεταπεσόντα* here as meaning "moved" from one *γραμμή* or division of the draught-board to another.

become the latter, and the latter in turn are shifted and become the former. R. P. 47.

(79) Time is a child playing draughts, the kingly power is a child's. R. P. 40 a.

(80) I have sought for myself. R. P. 48.

(81) We step and do not step into the same rivers; we are and are not. R. P. 33 a.

(82) It is a weariness to labour for the same masters and be ruled by them.

(83) It rests by changing.

(84) Even the posset separates if it is not stirred.

(85) Corpses are more fit to be cast out than dung.

(86) When they are born, they wish to live and to meet with their dooms—or rather to rest—and they leave children behind them to meet with their dooms in turn.

(87-89) A man may be a grandfather in thirty years.

(90) Those who are asleep are fellow-workers. . . .

(91*a*) Thought is common to all.

(91*b*) Those who speak with understanding must hold fast to what is common to all as a city holds fast to its law, and even more strongly. For all human laws are fed by the one divine law. It prevails as much as it will, and suffices for all things with something to spare. R. P. 43.

(92) So we must follow the common,[1] yet the many live as if they had a wisdom of their own. R. P. 44.

(93) They are estranged from that with which they have most constant intercourse.[2] R. P. 32 b.

(94) It is not meet to act and speak like men asleep.

(95) The waking have one common world, but the sleeping turn aside each into a world of his own.

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[1] Sext. *Math.* vii. 133, *διὸ δεῖ ἕπεσθαι τῷ ξυνῷ.* It seems to me that these words must belong to Herakleitos, though Bywater omits them. On the other hand, the words *τοῦ λόγου δὲ ὄντος ξυνοῦ* (so, not *δ' ἐόντος*, the best MSS.) seem clearly to belong to the Stoic interpreter whom Sextus is following, and who was anxious to connect this fragment with fr. 2 (*ὀλίγα προσδιελθὼν ἐπιφέρει*) in order to get the doctrine of the *κοινὸς λόγος*. The whole context in Sextus should be read.

[2] The words *λόγῳ τῷ τὰ ὅλα διοικοῦντι*, which Diels prints as part of this fragment, seem to me to belong to Marcus Aurelius and not to Herakleitos.

(96) The way of man has no wisdom, but that of God has. R. P. 45.

(97) Man is called a baby by God, even as a child by a man. R. P. 45.

(98, 99) The wisest man is an ape compared to God, just as the most beautiful ape is ugly compared to man.

(100) The people must fight for its law as for its walls. R. P. 43 b.

(101) Greater deaths win greater portions. R. P. 49 a.

(102) Gods and men honour those who are slain in battle. R. P. 49 a.

(103) Wantonness needs putting out, even more than a house on fire. R. P. 49 a.

(104) It is not good for men to get all they wish to get. It is sickness that makes health pleasant; evil,[1] good; hunger, plenty; weariness, rest. R. P. 48 b.

(105-107) It is hard to fight with one's heart's desire.[2] Whatever it wishes to get, it purchases at the cost of soul. R. P. 49 a.

(108, 109) It is best to hide folly; but it is hard in times of relaxation, over our cups.

(110) And it is law, too, to obey the counsel of one. R. P. 49 a.

(111) For what thought or wisdom have they? They follow the poets and take the crowd as their teacher, knowing not that there are many bad and few good. For even the best of them choose one thing above all others, immortal glory among mortals, while most of them are glutted like beasts.[3] R. P. 31 a.

(112) In Priene lived Bias, son of Teutamas, who is of more account than the rest. (He said, "Most men are bad.")

(113) One is ten thousand to me, if he be the best. R. P. 31 a.

(114) The Ephesians would do well to hang themselves,

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[1] Adopting Heitz's κακὸν for καὶ with Diels.

[2] The word θυμός has its Homeric sense. The gratification of desire implies the exchange of dry soul-fire (fr. 74) for moisture (fr. 72). Aristotle understood θυμός here as anger (*Eth. Nic.* B 2, 1105 a 8).

[3] This seems to be a clear reference to the "three lives." See Chap. II. § 45, p. 108.

every grown man of them, and leave the city to beardless lads; for they have cast out Hermodoros, the best man among them, saying, "We will have none who is best among us; if there be any such, let him be so elsewhere and among others." R. P. 29 b.

(115) Dogs bark at every one they do not know. R. P. 31 a.

(116) . . . (The wise man) is not known because of men's want of belief.

(117) The fool is fluttered at every word. R. P. 44 b.

(118) The most esteemed of them knows but fancies;[1] yet of a truth justice shall overtake the artificers of lies and the false witnesses.

(119) Homer should be turned out of the lists and whipped, and Archilochos likewise. R. P. 31.

(120) One day is like any other.

(121) Man's character is his fate.[2]

(122) There awaits men when they die such things as they look not for nor dream of. R. P. 46 d.

(123) . . . [3] that they rise up and become the wakeful guardians of the quick and dead. R. P. 46 d.

(124) Night-walkers, Magians, priests of Bakchos and priestesses of the wine-vat, mystery-mongers. . . .

(125) The mysteries practised among men are unholy mysteries. R. P. 48.

(126) And they pray to these images, as if one were to talk with a man's house, knowing not what gods or heroes are. R. P. 49 a.

(127) For if it were not to Dionysos that they made a procession and sang the shameful phallic hymn, they would be acting most shamelessly. But Hades is the same as Dionysos

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[1] Reading *δοκέοντα* with Schleiermacher (or *δοκέοντ' ὦν* with Diels). I have omitted *φυλάσσειν*, as I do not know what it means, and none of the conjectures commends itself.

[2] On the meaning of *δαίμων* here, see my edition of Aristotle's *Ethics*, pp. 1 sq. As Professor Gildersleeve puts it, the *δαίμων* is the individual form of *τύχη*, as *κήρ* is of *θάνατος*.

[3] I have not ventured to include the words *ἔνθα δ' ἐόντι* at the beginning, as the text seems to me too uncertain. See, however, Diels's interesting note.

in whose honour they go mad and keep the feast of the wine-vat. R. P. 49.

(129, 130) They vainly purify themselves by defiling themselves with blood, just as if one who had stepped into the mud were to wash his feet in mud. Any man who marked him doing thus, would deem him mad. R. P. 49 a.

The doxographical tradition.

66. It will be seen that some of these fragments are far from clear, and there are probably not a few of which the meaning will never be recovered. We naturally turn, then, to the doxographers for a clue; but, as ill-luck will have it, they are far less instructive with regard to Herakleitos than we have found them in other cases. We have, in fact, two great difficulties to contend with. The first is the unusual weakness of the doxographical tradition itself. Hippolytos, upon whom we can generally rely for a fairly accurate account of what Theophrastos really said, derived the material for his first four chapters, which treat of Thales, Pythagoras, Herakleitos, and Empedokles, not from the excellent epitome which he afterwards used, but from a biographical compendium,[1] which consisted for the most part of apocryphal anecdotes and apophthegms. It was based, further, on some writer of *Successions* who regarded Herakleitos and Empedokles as Pythagoreans. They are therefore placed side by side, and their doctrines are hopelessly mixed up together. The link between Herakleitos and the Pythagoreans was Hippasos of Metapontion, in whose system, as we know, fire played an important part.

[1] On the source used by Hippolytos in the first four chapters of *Ref.* i. see Diels, *Dox.* p. 145. We must carefully distinguish *Ref.* i. and *Ref.* ix. as sources of information about Herakleitos. The latter book is an attempt to show that the Monarchian heresy of Noetos was derived from Herakleitos instead of from the Gospel, and is a rich mine of Herakleitean fragments.

Theophrastos, following Aristotle, had spoken of the two in the same sentence, and this was enough to put the writers of *Successions* off the track.[1] We are forced, then, to look to the more detailed of the two accounts of the opinions of Herakleitos given in Diogenes,[2] which goes back to the *Vetusta Placita*, and is, fortunately, pretty full and accurate. All our other sources are more or less tainted.

The second difficulty which we have to face is even more serious. Most of the commentators on Herakleitos mentioned in Diogenes were Stoics,[3] and it is certain that their paraphrases were sometimes taken for the original. Now, the Stoics held the Ephesian in peculiar veneration, and sought to interpret him as far as possible in accordance with their own system. Further, they were fond of "accommodating"[4] the views of earlier thinkers to their own, and this has had serious consequences. In particular, the Stoic theories of the λόγος and the ἐκπύρωσις are constantly ascribed to Herakleitos by our authorities, and the very fragments are adulterated with scraps of Stoic terminology.

The discovery of Herakleitos

67. Herakleitos looks down not only on the mass of men, but on all previous inquirers into nature.

[1] Arist. *Met.* A, 3. 984 a 7 (R. P. 56 c): Theophr. *ap.* Simpl. *Phys.* 23, 33 (R. P. 36 c).

[2] For these double accounts see *Dox.* pp. 163 sqq. and Appendix, § 15.

[3] Diog. ix. 15 (R. P. 30 c). Schleiermacher rightly insisted upon this.

[4] The word *συνοικειοῦν* is used of the Stoic method of interpretation by Philodemos (cf. *Dox.* 547 b, n.), and Cicero (*N.D.* i. 41) renders it by *accommodare*. Chrysippos in particular gave a great impulse to this sort of thing, as we may best learn from Galen, *de Plac. Hippocr. et Plat.* Book iii. Good examples are Aet. i. 13, 2; 28, 1; iv. 3, 12,—where distinctively Stoic doctrines are ascribed to Herakleitos. What the Stoics were capable of, we see from Kleanthes, fr. 55, Pearson. He proposed to read Ζεῦ ἀναδωδωναῖε in *Il.* xvi. 233, ὡς τὸν ἐκ τῆς γῆς ἀναθυμιώμενον ἀέρα διὰ τὴν ἀνάδοσιν Ἀναδωδωναῖον ὄντα.

This must mean that he believed himself to have attained insight into some truth which had not hitherto been recognised, though it was, as it were, staring men in the face (fr. 93). Clearly, then, if we wish to get at the central thing in his teaching, we must try to find out what he was thinking of when he launched into those denunciations of human dulness and ignorance.[1] The answer seems to be given in two fragments, 18 and 45. From them we gather that the truth hitherto ignored is that the many apparently independent and conflicting things we know are really one, and that, on the other hand, this one is also many. The "strife of opposites" is really an "attunement" (*ἁρμονία*). From this it follows that wisdom is not a knowledge of many things, but the perception of the underlying unity of the warring opposites. That this really was the fundamental thought of Herakleitos is stated by Philo. He says: "For that which is made up of both the opposites is one; and, when the one is divided, the opposites are disclosed. Is not this just what the Greeks say their great and much belauded Herakleitos put in the forefront of his philosophy as summing it all up, and boasted of as a new discovery?"[2] We shall take the elements of this theory one by one, and see how they are to be understood.

The One and the Many.

68. Anaximander had taught already that the opposites were separated out from the Boundless, but passed away into it once more, so paying the penalty for their unjust encroachments on one another. It is

[1] See Patin, *Heraklits Einheitslehre* (1886). To Patin undoubtedly belongs the credit of showing clearly that the unity of opposites was the central doctrine of Herakleitos. It is not always easy, however, to follow him when he comes to details.

[2] Philo, *Rer. Div. Her.* 43 (R. P. 34 c).

here implied that there is something wrong in the war of opposites, and that the existence of the Many is a breach in the unity of the One. The truth which Herakleitos proclaimed was that there is no One without the Many, and no Many without the One. The world is at once one and many, and it is just the "opposite tension" of the Many that constitutes the unity of the One.

The credit of having been the first to see this is expressly assigned to Herakleitos by Plato. In the *Sophist* (242 d), the Eleatic stranger, after explaining how the Eleatics maintained that what we call many is really one, proceeds:—

But certain Ionian and (at a later date) certain Sicilian Muses remarked that it was safest to unite these two things, and to say that reality is both many and one, and is kept together by Hate and Love. "For," say the more severe Muses, "in its division it is always being brought together" (cf. fr. 59); while the softer Muses relaxed the requirement that this should always be so, and said that the All was alternately one and at peace through the power of Aphrodite, and many and at war with itself because of something they called Strife.

In this passage the Ionian Muses stand, of course, for Herakleitos, and the Sicilian for Empedokles. We remark also that the differentiation of the one into many, and the integration of the many into one, are both eternal and simultaneous, and that this is the ground upon which the system of Herakleitos is contrasted with that of Empedokles. We shall come back to that point again. Meanwhile we confine ourselves to this, that, according to Plato, Herakleitos taught that reality was at once many and one.

We must be careful, however, not to imagine that

what Herakleitos thus discovered was a logical principle. This was the mistake of Lassalle's book.[1] The identity in and through difference which he proclaimed was purely physical; logic did not yet exist, and as the principle of identity had not been formulated, it would have been impossible to protest against an abstract application of it. The identity which he explains as consisting in difference is simply that of the primary substance in all its manifestations. This identity had been realised already by the Milesians, but they had found a difficulty in the difference. Anaximander had treated the strife of opposites as an "injustice," and what Herakleitos set himself to show was that, on the contrary, it was the highest justice (fr. 62).

Fire. 69. All this made it necessary for him to seek out a new primary substance. He wanted not merely something out of which the diversified world we know might

[1] The source of his error was Hegel's remarkable statement that there was no proposition of Herakleitos that he had not taken up into his own logic (*Gesch. d. Phil.* i. 328). The example which he cites is the statement that Being does not exist any more than not-Being, for which he refers to Arist. *Met.* A, 4. This, however, is not there ascribed to Herakleitos at all, but to Leukippos or Demokritos, with whom it meant that space was as real as matter (§ 175). Aristotle does, indeed, tell us in the *Metaphysics* that "some" think Herakleitos says that the same thing can be and not be; but he adds that it does not follow that a man thinks what he says (*Met.* Γ 3. 1005 b 24). I take this to mean that, though Herakleitos did make this assertion in words, he did not mean by it what the same assertion would naturally have meant at a later date. Herakleitos was speaking only of nature; the logical meaning of the words never occurred to him. This is confirmed by K, 5. 1062 a 31, where we are told that by being questioned in a certain manner Herakleitos could be made to admit the principle of contradiction; as it was, he did not understand what he said. In other words, he was unconscious of its logical bearing.

Aristotle was aware, then, that the theories of Herakleitos were not to be understood in a logical sense. On the other hand, this does not prevent him from saying that according to the view of Herakleitos, everything would be true (*Met.* Δ, 7. 1012 a 24). If we remember his constant attitude to earlier thinkers, this will not lead us to suspect either his good faith or his intelligence. (See Appendix, § 2.)

conceivably be made, or from which opposites could be "separated out," but something which of its own nature would pass into everything else, while everything else would pass in turn into it. This he found in Fire, and it is easy to see why, if we consider the phenomenon of combustion, even as it appears to the plain man. The quantity of fire in a flame burning steadily appears to remain the same, the flame seems to be what we call a "thing." And yet the substance of it is continually changing. It is always passing away in smoke, and its place is always being taken by fresh matter from the fuel that feeds it. This is just what we want. If we regard the world as an "ever-living fire" (fr. 20), we can understand how it is always becoming all things, while all things are always returning to it.[1]

70. This necessarily brings with it a certain way of Flux.

[1] That the Fire of Herakleitos was something on the same level as the "Air" of Anaximenes and not a "symbol," is clearly implied in such passages as Arist. *Met.* A, 3. 984 a 5. In support of the view that something different from common fire is meant, Plato, *Crat.* 413 b, is sometimes quoted; but a consideration of the context shows that the passage will not bear this interpretation. Plato is discussing the derivation of δίκαιον from δια-ιόν, and certainly δίκη was a prominent Herakleitean conception, and a good deal that is here said may be the authentic doctrine of the school. Sokrates goes on to complain that when he asks what this is which "goes through" everything, he gets very inconsistent answers. One says it is the sun. Another asks if there is no justice after sunset, and says it is simply fire. A third says it is not fire itself, but the heat which is in fire. A fourth identifies it with Mind. Now all we are entitled to infer from this is that different accounts were given in the Herakleitean school. These were a little less crude than the original doctrine of the master, but for all that not one of them implies anything immaterial or symbolical. The view that it was not fire itself, but Heat, which "passed through" all things, is related to the theory of Herakleitos as Hippo's Moisture is related to the Water of Thales. It is quite likely, too, that some Herakleiteans attempted to fuse the system of Anaxagoras with their own, just as Diogenes of Apollonia tried to fuse it with that of Anaximenes. We shall see, indeed, that we still have a work in which this attempt is made (p. 167, n. 2).

looking at the change and movement of the world. Fire burns continuously and without interruption. It is therefore always consuming fuel and always liberating smoke. Everything is either mounting upwards to serve as fuel, or sinking downwards after having nourished the flame. It follows that the whole of reality is like an ever-flowing stream, and that nothing is ever at rest for a moment. The substance of the things we see is in constant change. Even as we look at them, some of the matter of which they are composed has already passed into something else, while fresh matter has come into them from another source. This theory is usually summed up, appropriately enough, in the phrase "All things are flowing" (*πάντα ῥεῖ*), though, as it happens, it cannot be proved that this is a quotation from Herakleitos. Plato, however, expresses the idea quite clearly. "Nothing ever is, everything is becoming"; "All things are in motion like streams"; "All things are passing, and nothing abides"; "Herakleitos says somewhere that all things pass and naught abides; and, comparing things to the current of a river, he says that you cannot step twice into the same stream" (cf. fr. 41)—these are the terms in which he describes the system. And Aristotle says the same thing, "All things are in motion," "nothing steadfastly is."[1] Herakleitos held, in fact, that any given thing, however stable in appearance, was merely a section in the stream, and that the matter composing it was never the same in any two consecutive moments of time. We shall see presently how he conceived this process to operate; meanwhile we remark that the idea was

[1] Plato, *Tht.* 152 e 1; *Crat.* 401 d 5, 402 a 8; Arist. *Top.* A, 11. 104 b 22; *de Caelo*, Γ, 1. 298 b 30; *Phys.* Θ, 3. 253 b 2.

not altogether novel, and that it is hardly the central point in the system of Herakleitos. The Milesians held a similar view. The flux of Herakleitos was at most more unceasing and universal.

The Upward and Downward path.

71. Herakleitos appears to have worked out the details of the perpetual flux with reference to the theories of Anaximenes.[1] It is unlikely, however, that he explained the transformations of matter by means of rarefaction and condensation.[2] Theophrastos, it appears, suggested that he did; but he allowed it was by no means clear. The passage from Diogenes which we are about to quote has faithfully preserved this touch.[3] In the fragments, at any rate, we find nothing about rarefaction and condensation. The expression used is "exchange" (fr. 22); and this is certainly a very good name for what happens when fire gives out smoke and takes in fuel instead.

It has been pointed out that, in default of Hippolytos, our best account of the Theophrastean doxography of Herakleitos is the fuller of the two accounts given in Laertios Diogenes. It is as follows:—

His opinions on particular points are these:—

He held that Fire was the element, and that all things were an exchange for fire, produced by condensation and rarefaction. But he explains nothing clearly. All things were produced in opposition, and all things were in flux like a river.

The all is finite and the world is one. It arises from fire, and is consumed again by fire alternately through all eternity in certain cycles. This happens according to fate. That which leads to the becoming of the opposites is called War and Strife; that which leads to the final conflagration is Concord and Peace.

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[1] See above, Chap. I. § 29.

[2] See, however, the remark of Diels quoted R. P. 36 c.

[3] Diog. ix. 8, *σαφῶς δ' οὐθὲν ἐκτίθεται.*

He called change the upward and the downward path, and held that the world comes into being in virtue of this. When fire is condensed it becomes moist, and when compressed it turns to water; water being congealed turns to earth, and this he calls the downward path. And, again, the earth is in turn liquefied, and from it water arises, and from that everything else; for he refers almost everything to the evaporation from the sea. This is the path upwards. R. P. 36.

He held, too, that exhalations arose both from the sea and the land; some bright and pure, others dark. Fire was nourished by the bright ones, and moisture by the others.

He does not make it clear what is the nature of that which surrounds the world. He held, however, that there were bowls in it with the concave sides turned towards us, in which the bright exhalations were collected and produced flames. These were the heavenly bodies.

The flame of the sun was the brightest and warmest; for the other heavenly bodies were more distant from the earth; and for that reason gave less light and heat. The moon, on the other hand, was nearer the earth; but it moved through an impure region. The sun moved in a bright and unmixed region, and at the same time was at just the right distance from us. That is why it gives more heat and light. The eclipses of the sun and moon were due to the turning of the bowls upwards, while the monthly phases of the moon were produced by a gradual turning of its bowl.

Day and night, months and seasons and years, rains and winds, and things like these, were due to the different exhalations. The bright exhalation, when ignited in the circle of the sun, produced day, and the preponderance of the opposite exhalations produced night. The increase of warmth proceeding from the bright exhalation produced summer, and the preponderance of moisture from the dark exhalation produced winter. He assigns the causes of other things in conformity with this.

As to the earth, he makes no clear statement about its nature, any more than he does about that of the bowls.

These, then, were his opinions. R. P. 39 b.

It is obvious that, if we can trust this passage, it is of the greatest possible value; and that, upon the whole, we can trust it is shown by the fact that it follows the exact order of topics to which all the doxographies derived from the great work of Theophrastos adhere. First we have the primary substance, then the world, then the heavenly bodies, and lastly, meteorological phenomena. We conclude, then, that it may be accepted with the exceptions, firstly, of the probably erroneous conjecture of Theophrastos as to rarefaction and condensation mentioned above; and secondly, of some pieces of Stoical interpretation which come from the *Vetusta Placita*.

Let us look at the details of the theory. The pure fire, we are told, is to be found chiefly in the sun. This, like the other heavenly bodies, is a trough or bowl, or perhaps a sort of boat, with the concave side turned towards us, in which the bright exhalations from the sea collect and burn. How does the fire of the sun pass into other forms? If we look at the fragments which deal with the downward path, we find that the first transformation that it undergoes is into sea, and we are further told that half of the sea is earth and half of it *πρηστήρ* (fr. 21). The full meaning of this we shall see presently, but we must settle at once what *πρηστήρ* is. Many theories have been advanced upon the subject; but, so far as I know, no one[1] has yet proposed to take the word in the sense which it always bears elsewhere, that, namely, of hurricane accompanied by a fiery waterspout.[2] Yet surely this is

[1] This was written in 1890. In his *Herakleitos von Ephesos* (1901) Diels takes it as I did, rendering *Glutwind*.

[2] Cf. Herod. vii. 42, and Lucretius, vi. 424. Seneca (*Quaest. Nat.* ii. 56) calls it *igneus turbo*. The opinions of early philosophers on these

just what is wanted. It is amply attested that Herakleitos explained the rise of the sea to fire by means of the bright evaporations; and we want a similar meteorological explanation of the passing of the fire back into sea. We want, in fact, something which will stand equally for the smoke produced by the burning of the sun and for the immediate stage between fire and water. What could serve the turn better than a fiery waterspout? It sufficiently resembles smoke to be accounted for as the product of the sun's combustion, and it certainly comes down in the form of water. And this interpretation becomes practically certain when taken in connexion with the report of Aetios as to the Herakleitean theory of *πρηστῆρες*. They were due, we are told, "to the kindling and extinction of clouds."[1] In other words, the bright vapour, after kindling in the bowl of the sun and going out again, reappears as the dark fiery storm-cloud, and so passes once more into sea. At the next stage we find water continually passing into earth. We are already familiar with this idea (§ 10), and no more need be said about it. Turning to the "upward path," we find that the earth is liquefied in the same proportion as the sea becomes earth, so that the sea is still "measured by the same tale" (fr. 23). Half of it is earth and half of it is *πρηστήρ* (fr. 21). This must mean that, at any given moment, half of the sea is taking the downward

phenomena are collected in Aetios, iii. 3. The *πρηστήρ* of Anaximander (Chap. I. p. 69, n. 2) is a different thing altogether, but it is quite likely that Greek sailors named the meteorological phenomenon after the familiar bellows of the smith.

[1] Aet. iii. 3, 9, *πρηστῆρας δὲ κατὰ νεφῶν ἐμπρήσεις καὶ σβέσεις* (sc. Ἡράκλειτος *ἀποφαίνεται γίγνεσθαι*). Diels (*Herakleitos*, p. v.) seems to regard the *πρηστήρ* as the form in which water ascends to heaven. But the Greeks were well aware that waterspouts burst and come down.

path, and has just been fiery storm-cloud, while half of it is going up, and has just been earth. In proportion as the sea is increased by rain, water passes into earth; in proportion as the sea is diminished by evaporation, it is fed by the earth. Lastly, the ignition of the bright vapour from the sea in the bowl of the sun completes the circle of the "upward and downward path."

72. The question now arises, How is it that, in spite of this constant flux, things appear relatively stable? The answer of Herakleitos was that it is owing to the observance of the "measures," in virtue of which the aggregate bulk of each form of matter in the long run remains the same, though its substance is constantly changing. Certain "measures" of the "ever-living fire" are always being kindled, while like "measures" are always going out (fr. 20); and these measures the sun will not exceed. All things are "exchanged" for fire and fire for all things (fr. 22), and this implies that for everything it takes, fire will give as much. "The sun will not exceed his measures" (fr. 29). Measure for measure.

And yet the "measures" are not to be regarded as absolutely fixed. We gather from the passage of Diogenes quoted above that Theophrastos spoke of an alternate preponderance of the bright and dark exhalations, and Aristotle speaks of Herakleitos as explaining all things by evaporation.[1] In particular, the alternation of day and night, summer and winter, were accounted for in this way. Now, in a passage of the pseudo-Hippokratean treatise Περὶ διαίτης which is almost certainly of Herakleitean origin,[2] we read of an

[1] Arist. *de An.* B, 2. 405 a 26, τὴν ἀναθυμίασιν ἐξ ἧς τἆλλα συνίστησιν.

[2] The presence of Herakleitean matter in this treatise was pointed out by Gesner, but Bernays was the first to make any considerable use of it in reconstructing the system. The older literature of the subject has been in

"advance of fire and water" in connexion with day and night and the courses of the sun and moon.[1] In fr. 26, again, we read of fire "advancing," and all these things seem to be intimately connected. We must therefore try to see whether there is anything in the remaining fragments that bears upon the subject.

Man. 73. In studying this alternate advance of fire and water, it will be convenient to start with the microcosm. We have more definite information about the two exhalations in man than about the analogous processes in the world at large, and it would seem that Herakleitos himself explained the world by man rather than man by the world. In a well-known passage, Aristotle implies that soul is identical with the dry exhalation,[2] and this is fully confirmed by the fragments.

the main superseded by Carl Fredrichs' *Hippokratische Untersuchungen* (1899), where also a satisfactory text of the sections which concern us is given for the first time. Fredrichs shows that (as I said already in the first edition) the work belongs to the period of eclecticism and reaction which I have briefly characterised in § 184, and he points out that c 3, which was formerly supposed to be mainly Herakleitean, is really from some work which was strongly influenced by Empedokles and Anaxagoras. I think, however, that he goes wrong in attributing the section to a nameless "Physiker" of the school of Archelaos, or even to Archelaos himself; it is far more like what we should expect from the eclectic Herakleiteans whom Plato describes in *Crat.* 413 c (see p. 161, n. 1). He is certainly wrong in holding the doctrine of the balance of fire and water not to be Herakleitean, and there is no justification for separating the remark quoted in the text from its context because it happens to agree almost verbally with the beginning of c. 3. As we shall see, that passage too is of Herakleitean origin.

[1] Περὶ διαίτης, i. 5. I should read thus: *ἡμέρη καὶ εὐφρόνη ἐπὶ τὸ μήκιστον καὶ ἐλάχιστον· ἥλιος, σελήνη ἐπὶ τὸ μήκιστον καὶ ἐλάχιστον· πυρὸς ἔφοδος καὶ ὕδατος.* In any case, the meaning is the same, and the sentence occurs between *χωρεῖ δὲ πάντα καὶ θεῖα καὶ ἀνθρώπινα ἄνω καὶ κάτω ἀμειβόμενα* and *πάντα ταὐτὰ καὶ οὐ τὰ αὐτά,* which are surely Herakleitean utterances.

[2] Arist. *de An.* A, 2. 405 a 25 (R. P. 38). Diels attributes to Herakleitos himself the words *καὶ ψυχαὶ δὲ ἀπὸ τῶν ὑγρῶν ἀναθυμιῶνται*, which are found in Areios Didymos after fr. 42. I can hardly believe, however, that the *word* *ἀναθυμίασις* is Herakleitean. He seems rather to have called the two exhalations *καπνός* and *ἀήρ* (cf. fr. 37).

Man is made up of three things, fire, water, and earth. But, just as in the macrocosm fire is identified with the one wisdom, so in the microcosm the fire alone is conscious. When it has left the body, the remainder, the mere earth and water, is altogether worthless (fr. 85). Of course, the fire which animates man is subject to the "upward and downward path," just as much as the fire of the world. The *Περὶ διαίτης* has preserved the obviously Herakleitean sentence: "All things are passing, both human and divine, upwards and downwards by exchanges."[1] We are just as much in perpetual flux as anything else in the world. We are and are not the same for two consecutive instants (fr. 81). The fire in us is perpetually becoming water, and the water earth; but, as the opposite process goes on simultaneously, we appear to remain the same.[2]

74. This, however, is not all. Man is subject to a certain oscillation in his "measures" of fire and water, and this gives rise to the alternations of sleeping and waking, life and death. The *locus classicus* on this subject is a passage of Sextus Empiricus, which reproduces the account of the Herakleitean psychology given by Ainesidemos (Skeptic, *c.* 80-50 B.C.).[3] It is as follows (R. P. 41):— (*a*) Sleeping and waking.

[1] Περὶ διαίτης, i. 5, *χωρεῖ δὲ πάντα καὶ θεῖα καὶ ἀνθρώπινα ἄνω καὶ κάτω ἀμειβόμενα.*

[2] We seem to have a clear reference to this in Epicharmos, fr. 2, Diels (170 b, Kaibel): "Look now at men too. One grows and another passes away, and all are in change always. What changes in its substance (*κατὰ φύσιν*) and never abides in the same spot, will already be something different from what has passed away. So thou and I were different yesterday, and are now quite other people, and again we shall become others and never the same again, and so on in the same way." This is put into the mouth of a debtor who does not wish to pay. See Bernays on the *αὐξανόμενος λόγος* (*Ges. Abh.* i. pp. 109 sqq.).

[3] Sextus quotes "Ainesidemos according to Herakleitos." Natorp holds (*Forschungen*, p. 78) that Ainesidemos really did combine

The natural philosopher is of opinion that what surrounds us[1] is rational and endowed with consciousness. According to Herakleitos, when we draw in this divine reason by means of respiration, we become rational. In sleep we forget, but at our waking we become conscious once more. For in sleep, when the openings of the senses close, the mind which is in us is cut off from contact with that which surrounds us, and only our connexion with it by means of respiration is preserved as a sort of root (from which the rest may spring again); and, when it is thus separated, it loses the power of memory that it had before. When we awake again, however, it looks out through the openings of the senses, as if through windows, and coming together with the surrounding mind, it assumes the power of reason. Just, then, as embers, when they are brought near the the fire, change and become red-hot, and go out when they are taken away from it again, so does the portion of the surrounding mind which sojourns in our body become irrational when it is cut off, and so does it become of like nature to the whole when contact is established through the greatest number of openings.

In this passage there is obviously a very large admixture of later phraseology and of later ideas. In particular, the identification of "that which surrounds us" with the air cannot be Herakleitean; for Herakleitos can have known nothing of air, which in his day was regarded as a form of water (§ 27). The reference to the pores or openings of the senses is probably foreign to him also; for the theory of pores is due to Alkmaion (§ 96). Lastly, the distinction between mind and body is far too sharply drawn. On the other hand, the important rôle assigned to respiration may very well be Herakleitean; for we

Herakleiteanism with Skepticism. Diels, on the other hand (*Dox.* pp. 210, 211), insists that Ainesidemos only gave an account of the theories of Herakleitos. This controversy does not affect the use we make of the passage.

[1] τὸ περιέχον ἡμᾶς, opposed to but parallel with τὸ περιέχον τὸν κόσμον.

have met with it already in Anaximenes. And we can hardly doubt that the striking simile of the embers which glow when they are brought near the fire is genuine (cf. fr. 77). The true Herakleitean doctrine doubtless was, that sleep was produced by the encroachment of moist, dark exhalations from the water in the body, which cause the fire to burn low. In sleep, we lose contact with the fire in the world which is common to all, and retire to a world of our own (fr. 95). In a soul where the fire and water are evenly balanced, the equilibrium is restored in the morning by an equal advance of the bright exhalation.

75. But in no soul are the fire and water thus evenly balanced for long. One or the other acquires predominance, and the result in either case is death. Let us take each of these cases in turn. It is death, we know, to souls to become water (fr. 68); but that is just what happens to souls which seek after pleasure. For pleasure is a moistening of the soul (fr. 72), as may be seen in the case of the drunken man, who, in pursuit of it, has moistened his soul to such an extent that he does not know where he is going (fr. 73). Even in gentle relaxation over our cups, it is more difficult to hide folly than at other times (fr. 108). That is why it is so necessary for us to quench wantonness (fr. 103); for whatever our heart's desire insists on it purchases at the price of life, that is, of the fire within us (fr. 105). Take now the other case. The dry soul, that which has least moisture, is the best (fr. 74); but the preponderance of fire causes death as much as that of water. It is a very different death, however, and wins "greater portions" for those who die it (fr. 101). Apparently those who fall in battle

(b) Life and death.

share their lot (fr. 102). We have no fragment which tells us directly what it is, but the class of utterances we are about to look at next leaves little doubt on the subject. Those who die the fiery and not the watery death, become, in fact, gods, though in a different sense from that in which the one Wisdom is god. It is probable that the corrupt fragment 123 refers to this unexpected fate (fr. 122) that awaits men when they die.

Further, just as summer and winter are one, and necessarily reproduce one another by their "opposite tension," so do life and death. They, too, are one, we are told; and so are youth and age (fr. 78). It follows that the soul will be now living and now dead; that it will only turn to fire or water, as the case may be, to recommence once more its unceasing upward and downward path. The soul that has died from excess of moisture sinks down to earth; but from the earth comes water, and from water is once more exhaled a soul (fr. 68). So, too, we are told (fr. 67) that gods and men are really one. They live each others' life, and die each others' death. Those mortals that die the fiery death become immortal,[1] they become the guardians of the quick and the dead (fr. 123);[2] and

[1] The popular word is used for the sake of its paradoxical effect. Strictly speaking, they are all mortal from one point of view and immortal from another.

[2] We need not hesitate to ascribe to Herakleitos the view that the dead become guardian demons of the living; it appears already in Hesiod, *Works and Days*, 121, and the Orphic communities had popularised it. Rohde, *Psyche* (pp. 442 sqq.), refused to admit that Herakleitos believed the soul survived after death. Strictly speaking, it is no doubt an inconsistency; but I believe, with Zeller and Diels, that it is one of a kind we may well admit. Many thinkers have spoken of a personal immortality, though there was really no room for it in their systems. It is worthy of note in this connexion that the first argument which Plato uses to establish the doctrine of immortality in the *Phaedo* is just the Herakleitean parallelism of life and death with sleeping and waking.

those immortals become mortal in their turn. Everything is really the death of something else (fr. 64). The living and the dead are always changing places (fr. 78), like the pieces on a child's draught-board (fr. 79), and this applies not only to the souls that have become water, but to those that have become fire and are now guardian spirits. The real weariness is continuance in the same state (fr. 82), and the real rest is change (fr. 83). Rest in any other sense is tantamount to dissolution (fr. 84).[1] So they too are born once more. Herakleitos estimated the duration of the cycle which preserves the balance of life and death as thirty years, the shortest time in which a man may become a grandfather (frs. 87-89).[2]

76. Let us turn now to the world. Diogenes tells us that fire was kept up by the bright vapours from land and sea, and moisture by the dark.[3] What are these "dark" vapours which increase the moist element? If we remember the "Air" of Anaximenes, we shall be inclined to regard them as darkness itself. We know that the idea of darkness as privation of light is not natural to the unsophisticated mind. We sometimes hear even now of darkness "thick enough to cut with a knife." I suppose, then, that Herakleitos believed

The day and the year.

[1] These fragments are quoted by Plotinos, Iamblichos, and Noumenios in this very connexion (see R. P. 46 c), and it does not seem to me possible to hold, with Rohde, that they had no grounds for so interpreting them. They knew the context and we do not.

[2] Plut. *def. orac.* 415 d, ἔτη τριάκοντα ποιοῦσι τὴν γενεὰν καθ' Ἡράκλειτον, ἐν ᾧ χρόνῳ γεννῶντα παρέχει τὸν ἐξ αὐτοῦ γεγεννημένον ὁ γεννήσας. Philo, fr. Harris, p. 20, δυνατὸν ἐν τριακοστῷ ἔτει αὖ τὸν ἄνθρωπον πάππον γενέσθαι κ.τ.λ. Censorinus, *de die nat.* 17, 2, "hoc enim tempus (triaginta annos) *genean* vocari Heraclitus auctor est, quia *orbis aetatis* in eo sit spatio: orbem autem vocat aetatis, dum natura ab sementi humana ad sementim revertitur." The words *orbis aetatis* seem to mean αἰῶνος κύκλος, "the circle of life." If so, we may compare the Orphic κύκλος γενέσεως.

[3] Diog. ix. 9 (R. P. 39 b).

night and winter to be produced by the rise of darkness from earth and sea,—he saw, of course, that the valleys were dark before the hill-tops,—and that this darkness, being moist, so increased the watery element as to put out the sun's light. This, however, destroys the power of darkness itself. It can no longer rise upwards unless the sun gives it motion, and so it becomes possible for a fresh sun (fr. 32) to be kindled, and to nourish itself at the expense of the moist element for a time. But it can only be for a time. The sun, by burning up the bright vapour, deprives himself of nourishment, and the dark vapour once more gets the upper hand. It is in this sense that "day and night are one" (fr. 35). Each implies the other, and they are therefore to be regarded as merely two sides of the one, in which alone their true ground of explanation is to be found (fr. 36).

Summer and winter were easily to be explained in the same way. We know that the "turnings" of the sun were a subject of interest in those days, and it was natural for Herakleitos to see in its retreat further to the south the gradual advance of the moist element, caused by the heat of the sun itself. This, however, diminishes the power of the sun to cause evaporation, and so it must return to the north once more that it may supply itself with nourishment. Such was, at any rate, the Stoic doctrine on the subject,[1] and that it comes from Herakleitos seems to be proved by its

[1] See Kleanthes, fr. 29, Pearson, *ὠκεανὸς δ' ἐστὶ <καὶ γῆ> ἧς τὴν ἀναθυμίασιν ἐπινέμεται (ὁ ἥλιος)*. Cf. Cic. *N.D.* iii. 37: "Quid enim? non eisdem vobis placet omnem ignem pastus indigere nec permanere ullo modo posse, nisi alitur: ali autem solem, lunam, reliqua astra aquis, alia dulcibus (from the earth), alia marinis? eamque causam Cleanthes adfert cur se sol referat nec longius progrediatur solstitiali orbi itemque brumali, ne longius discedat a cibo."

occurrence in the Περὶ διαίτης. It seems impossible to refer the following sentence to any other source:—

And in turn each (fire and water) prevails and is prevailed over to the greatest and least degree that is possible. For neither can prevail altogether for the following reasons. If fire advances towards the utmost limit of the water, its nourishment fails it. It retires, then, to a place where it can get nourishment. And if water advances towards the utmost limit of the fire, movement fails it. At that point, then, it stands still; and, when it has come to a stand, it has no longer power to resist, but is consumed as nourishment for the fire that falls upon it. For these reasons neither can prevail altogether. But if at any time either should be in any way overcome, then none of the things that exist would be as they are now. So long as things are as they are, fire and water will always be too, and neither will ever fail.[1]

77. Herakleitos spoke also of a longer period, which is identified with the "Great Year," and is variously described as lasting 18,000 and 10,800 years.[2] We have no definite statement, however, of what process Herakleitos supposed to take place in the Great Year. We have seen that the period of 36,000 years was, in all probability, Babylonian, and was that of the revolution which produces the precession of the equinoxes.[3] **The Great Year.**

[1] For the Greek text of this passage, see below, p. 183, n. 1. Fredrichs allows that it is from the same source as that quoted above (p. 169), and, as that comes from Περὶ διαίτης, i. 3, he denies the Herakleitean origin of this too. He has not taken account of the fact that it gives the Stoic doctrine, which raises a presumption in favour of that being Herakleitean. If I could agree with Fredrichs' theory, I should still say that the present passage was a Herakleitean interpolation in the *Physiker* rather than that the other was an interpolation from the *Physiker* in the Herakleitean section. As it is, I find no difficulty in believing that both passages give the Herakleitean doctrine, though it becomes mixed up with other theories in the sequel. See p. 167, n. 2.

[2] Aet. ii. 32, 3, Ἡράκλειτος ἐκ μυρίων ὀκτακισχιλίων ἐνιαυτῶν ἡλιακῶν (τὸν μέγαν ἐνιαυτὸν εἶναι). Censorinus, *de die nat.* 11, Heraclitus et Linus, XDCCC.

[3] See Introd. § XII. p. 25, n. 2.

Now 18,000 years is just half that period, a fact which may be connected with Herakleitos's way of dividing all cycles into an "upward and downward path." It is not at all likely, however, that Herakleitos, who held with Xenophanes that the sun was "new every day," would trouble himself about the precession of the equinoxes, and we seem forced to assume that he gave some new application to the traditional period. The Stoics, or some of them, held that the Great Year was the period between one world-conflagration and the next. They were careful, however, to make it a good deal longer than Herakleitos did, and, in any case, we are not entitled without more ado to credit him with the theory of a general conflagration.[1] We must try first, if possible, to interpret the Great Year on the analogy of the shorter periods discussed already.

Now we have seen that a generation is the shortest time in which a man can become a grandfather, it is the period of the upward or downward path of the soul, and the most natural interpretation of the longer period would surely be that it represents the time taken by a "measure" of the fire in the world to travel on the downward path to earth or return to fire once more by the upward path. Plato certainly implies that such a parallelism between the periods of man and the world

[1] For the Stoic doctrine, cf. Nemesios, *de nat. hom.* 38 (R. P. 503). Mr. Adam allowed that no destruction of the world or conflagration marked the end of Plato's year, but he declined to draw what seems to me the natural inference that the connexion between the two things belongs to a later age, and should not, therefore, be ascribed to Herakleitos in the absence of any evidence that he did so connect them. Nevertheless, his treatment of these questions in the second volume of his edition of the *Republic*, pp. 302 sqq., must form the basis of all further discussion on the subject. It has certainly helped me to put the view which he rejects (p. 303, n. 9) in what I hope will be found a more convincing form.

was recognised,[1] and this receives a curious confirmation from a passage in Aristotle, which is usually supposed to refer to the doctrine of a periodic conflagration. He is discussing the question whether the "heavens," that is to say, what he calls the "first heaven," is eternal or not, and he naturally enough, from his own point of view, identifies this with the Fire of Herakleitos. He quotes him along with Empedokles as holding that the "heavens" are alternately as they are now and in some other state, one of passing away; and he goes on to point out that this is not really to say they pass away, any more than it would be to say that a man ceases to be, if we said that he turned from boy to man and then from man to boy again.[2] It is surely clear that this is a reference to the parallel between the generation and the Great Year, and, if so, the ordinary interpretation of the passage must be wrong. It is true that it is not quite consistent with the theory to suppose that a "measure" of Fire could preserve its identity throughout the whole of its upward and downward path; but it is exactly the same inconsistency that we have felt bound to recognise with regard to the continuance of individual souls, a fact which is really in favour of our interpretation. It should be added that, while 18,000 is half 36,000, 10,800 is 360 × 30, which

[1] This is certainly the general sense of the parallelism between the periods of the ἀνθρώπειον and the θεῖον γεννητόν, however we may understand the details. See Adam, *Republic*, vol. ii. pp. 288 sqq.

[2] Arist. *de Caelo*, A, 10. 279 b 14, οἱ δ' ἐναλλὰξ ὁτὲ μὲν οὕτως ὁτὲ δὲ ἄλλως ἔχειν φθειρόμενον, . . . ὥσπερ Ἐμπεδοκλῆς ὁ Ἀκραγαντῖνος καὶ Ἡράκλειτος ὁ Ἐφέσιος. Aristotle points out that this really amounts only to saying that it is eternal and changes its form, ὥσπερ εἴ τις ἐκ παιδὸς ἄνδρα γιγνόμενον καὶ ἐξ ἀνδρὸς παῖδα ὁτὲ μὲν φθείρεσθαι, ὁτὲ δ' εἶναι οἴοιτο (280 a 14). The point of the reference to Empedokles will appear from *de Gen. Corr.* B, 6. 334 a 1 sqq. What Aristotle finds fault with in both theories is that they do not regard the substance of the heavens as something outside the upward and downward motion of the elements.

would make each generation a day in the Great Year.[1]

Did Herakleitos teach a general conflagration?

78. Most modern writers, however, ascribe to Herakleitos the doctrine of a periodical conflagration or ἐκπύρωσις, to use the Stoic term.[2] That this is inconsistent with the theory, as we have interpreted it, is obvious, and is indeed admitted by Zeller. To his paraphrase of the statement of Plato quoted above (p. 159) he adds the words: "Herakleitos did not intend to retract this principle in the doctrine of a periodic change in the constitution of the world; if the two doctrines are not compatible, it is a contradiction which he has not observed." Now, it is in itself quite likely that there were contradictions in the discourse of Herakleitos, but it is very unlikely that there was this particular one. In the first place, it is a contradiction of the central idea of his system, the thought that possessed his whole mind (§ 67), and we can only admit the possibility of that, if the evidence for it should prove irresistible. In the second place, such an interpretation destroys the whole point of Plato's contrast between Herakleitos and Empedokles (§ 68), which is just that, while Herakleitos said the One was always many, and the Many always one, Empedokles said the All was many and one by turns. Zeller's interpretation obliges us, then, to suppose that Herakleitos flatly contradicted his own discovery without noticing it, and that Plato, in discussing this very discovery, was also blind to the contradiction.[3]

[1] This is practically Lassalle's view of the Great Year, except that he commits the anachronism of speaking of "atoms" of fire instead of "measures."

[2] Schleiermacher and Lassalle are notable exceptions. Zeller, Diels, and Gomperz are all positive that Herakleitos believed in the ἐκπύρωσις.

[3] In his fifth edition (p. 699) Zeller seems to feel this last difficulty; for

Nor is there anything in Aristotle to set against Plato's emphatic statement. We have seen that the passage in which he speaks of him along with Empedokles as holding that the heavens were alternately in one condition and in another refers not to the world in general, but to fire, which Aristotle identified with the substance of his own "first heaven."[1] It is also quite consistent with our interpretation when he says that all things at one time or another become fire. This does not necessarily mean that they all become fire at the same time, but is merely a statement of the undoubted Herakleitean doctrine of the upward and downward path.[2]

The only clear statements to the effect that Herakleitos taught the doctrine of a general conflagration are posterior to the rise of Stoicism. It is unnecessary to enumerate them, as there is no doubt about their meaning. The Christian apologists too were interested in the idea of a final conflagration, and reproduce the Stoic view. The curious thing, however, is that there was a difference of opinion on the subject

he now says: "It is a contradiction which he, *and which probably Plato too* (*und den wahrscheinlich auch Plato*) has not observed." This seems to me still less arguable. Plato may or may not be mistaken; but he makes the perfectly definite statement that Herakleitos says ἀεί, while Empedokles says ἐν μέρει. The Ionian Muses are called συντονώτεραι and the Sicilian μαλακώτεραι just because the latter "lowered the pitch" (ἐχάλασαν) of the doctrine that this is always so (τὸ ἀεὶ ταῦτα οὕτως ἔχειν).

[1] See above, p. 177, n. 2.

[2] *Phys.* Γ 5, 205 a 3 (*Met.* K, 10. 1067 a 4), ὥσπερ Ἡράκλειτός φησιν ἅπαντα γίνεσθαί ποτε πῦρ. Even in his fifth edition (p. 691) Zeller translates this *es werde alles dereinst zu Feuer werden*; but that would require γενήσεσθαι. Nor is there anything in his suggestion that ἅπαντα ("not merely πάντα") implies that all things become fire at once. In Aristotle's day, there was no distinction of meaning between πᾶς and ἅπας. Even if he had said σύμπαντα, we could not press it. What is really noticeable is the present infinitive γίνεσθαι, which surely suggests a continuous process, not a series of conflagrations.

even among the Stoics. In one place, Marcus Aurelius says: "So that all these things are taken up into the Reason of the universe, whether by a periodical conflagration or a renovation effected by external exchanges."[1] Indeed, there were some who said there was no general conflagration at all in Herakleitos. "I hear all that," Plutarch makes one of his personages say, "from many people, and I see the Stoic conflagration spreading over the poems of Hesiod, just as it does over the writings of Herakleitos and the verses of Orpheus."[2] We see from this that the question was debated, and we should therefore expect that any statement of Herakleitos which could settle it would be quoted over and over again. It is highly significant that not a single quotation of the kind can be produced.

On the contrary, the absence of anything to show that Herakleitos spoke of a general conflagration only becomes more patent when we turn to the few fragments which are supposed to prove it. The favourite is fr. 24, where we are told that Herakleitos said Fire was Want and Surfeit. That is just in his manner, and it has a perfectly intelligible meaning on our interpretation, which is further confirmed by fr. 36. On the other hand, it seems distinctly artificial to understand the

[1] Marcus Aurelius, x. 7, *ὥστε καὶ ταῦτα ἀναληφθῆναι εἰς τὸν τοῦ ὅλου λόγον, εἴτε κατὰ περίοδον ἐκπυρουμένου, εἴτε ἀιδίοις ἀμοιβαῖς ἀνανεουμένου.* The *ἀμοιβαί* are specifically Herakleitean, and the statement is the more remarkable as Marcus elsewhere follows the usual Stoic interpretation.

[2] Plut. *de def. orac.* 415 f, *καὶ ὁ* Κλεόμβροτος, *'Ακούω ταῦτ', ἔφη, πολλῶν καὶ ὁρῶ τὴν Στωικὴν ἐκπύρωσιν ὥσπερ τὰ* 'Ηρακλείτου *καὶ* 'Ορφέως *ἐπινεμομένην ἔπη οὕτω καὶ τὰ* 'Ησιόδου *καὶ συνεξάπτουσαν.* As Zeller admits (p. 693 n.), this proves that some opponents of the Stoic *ἐκπύρωσις* tried to withdraw the support of Herakleitos from it. Could they have done so if Herakleitos had said anything about it, or would not some one have produced a decisive quotation? We may be sure that, if any one had, it would have been reiterated *ad nauseam*, for the indestructibility of the world was one of the great questions of the day.

Surfeit as referring to the fact that fire has burnt everything else up, and still more so to interpret Want as meaning that fire, or most of it, has turned into a world. The next is fr. 26, where we read that fire in its advance will judge and convict all things. There is nothing in this, however, to suggest that fire will judge all things at once rather than in turn, and, indeed, the phraseology reminds us of the advance of fire and water which we have seen reason for attributing to Herakleitos, but which is expressly said to be limited to a certain maximum.[1] These appear to be the only passages which the Stoics and the Christian apologists could discover, and, whether our interpretation of them is right or wrong, it is surely obvious that they cannot bear the weight of their conclusion, and that there was certainly nothing more definite to be found.

It is much easier to find fragments which are on the face of them inconsistent with a general conflagration. The "measures" of fr. 20 and fr. 29 must be the same thing, and they must surely be interpreted in the light of fr. 23. If this be so, fr. 20, and more especially fr. 29, directly contradict the idea of a general conflagration. "The sun will not overstep his measures."[2] Secondly, the metaphor of "exchange," which is applied to the transformations of fire in fr. 22, points in the same direction. When gold is given in exchange for wares and wares for gold, the sum or "measure" of each remains constant, though they change owners. All the wares and gold do not come

[1] Περὶ διαίτης, i. 3, *ἐν μέρει δὲ ἑκάτερον κρατεῖ καὶ κρατεῖται ἐς τὸ μήκιστον καὶ ἐλάχιστον ὡς ἀνυστόν.*

[2] If any one doubts that this is really the meaning of the "measures," let him compare the use of the word by Diogenes of Apollonia, fr. 3.

into the same hands. In the same way, when anything becomes fire, something of equal amount must cease to be fire, if the "exchange" is to be a just one; and that it will be just, we are assured by the watchfulness of the Erinyes (fr. 29), who see to it that the sun does not take more than he gives. Of course there is, as we have seen, a certain variation; but this is strictly confined within limits, and is compensated in the long run by a variation in the other direction. Thirdly, fr. 43, in which Herakleitos blames Homer for desiring the cessation of strife, is very conclusive. The cessation of strife would mean that all things should take the upward or downward path at the same time, and cease to "run in opposite directions." If they all took the upward path, we should have a general conflagration. Now, if Herakleitos had himself held that this was the appointment of fate, would he have been likely to upbraid Homer for desiring so necessary a consummation?[1] Fourthly, we note that in fr. 20 it is *this* world,[2] and not merely the "ever-living fire," which is said to be eternal; and it appears also that its eternity depends upon the fact that it is always kindling and always going out in the same "measures," or that an encroachment in one direction is compensated by a subsequent encroachment in the other. Lastly, Lassalle's argument from the concluding sentence of the passage from the Περὶ διαίτης, quoted above, is

[1] This is just the argument which Plato uses in the *Phaedo* (72 c) to prove the necessity of ἀνταπόδοσις, and the whole series of arguments in that passage is distinctly Herakleitean in character.

[2] However we understand the term κόσμος here, the meaning is the same. Indeed, if we suppose with Bernays that it means "order," the argument in the text will be all the stronger. In no sense of the word could a κόσμος survive the ἐκπύρωσις, and the Stoics accordingly said the κόσμος was φθαρτός.

really untouched by Zeller's objection, that it cannot be Herakleitean because it implies that all things are fire and water. It does not imply this, but only that *man*, like the heavenly bodies, oscillates between fire and water; and that is just what Herakleitos taught. It does not appear either that the measures of earth varied at all. Now, in this passage we read that neither fire nor water can prevail completely, and a very good reason is given for this, a reason too which is in striking agreement with the other views of Herakleitos.[1] And, indeed, it is not easy to see how, in accordance with these views, the world could ever recover from a general conflagration if such a thing were to take place. The whole process depends, so far as we can see, on the fact that Surfeit is also Want, or, in other words, that an advance of fire increases the moist exhalation, while an advance of water deprives the fire of the power to cause evaporation. The conflagration, though it lasted but for a moment,[2] would destroy the opposite tension on which the rise of a new world depends, and then motion would become impossible.

[1] *Περὶ διαίτης*, i. 3 (see above, p. 167, n. 2), *οὐδέτερον γὰρ κρατῆσαι παντελῶς δύναται διὰ τάδε· τό <τε> πῦρ ἐπεξιὸν ἐπὶ τὸ ἔσχατον τοῦ ὕδατος ἐπιλείπει ἡ τροφή· ἀποτρέπεται οὖν ὅθεν μέλλει τρέφεσθαι· τὸ ὕδωρ τε ἐπεξιὸν τοῦ πυρὸς ἐπὶ τὸ ἔσχατον, ἐπιλείπει ἡ κίνησις· ἵσταται οὖν ἐν τούτῳ, ὅταν δὲ στῇ, οὐκέτι ἐγκρατές ἐστιν, ἀλλ' ἤδη τῷ ἐμπίπτοντι πυρὶ ἐς τὴν τροφὴν καταναλίσκεται· οὐδέτερον δὲ διὰ ταῦτα δύναται κρατῆσαι παντελῶς, εἰ δέ ποτε κρατηθείη καὶ ὁπότερον, οὐδὲν ἂν εἴη τῶν νῦν ἐόντων ὥσπερ ἔχει νῦν· οὕτω δὲ ἐχόντων ἀεὶ ἔσται τὰ αὐτὰ καὶ οὐδέτερον οὐδαμὰ ἐπιλείψει.*

[2] In his note on fr. 66 (=26 Byw.), Diels seeks to minimise the difficulty of the *ἐκπύρωσις* by saying that it is only a little one, and can last but a moment; but the contradiction noted above remains all the same. Diels holds that Herakleitos was "dark only in form," and that "he himself was perfectly clear as to the sense and scope of his ideas" (*Herakleitos*, p. i.). To which I would add that he was probably called "the Dark" just because the Stoics sometimes found it hard to read their own ideas into his words.

Strife and "harmony."

79. We are now in a position to understand more clearly the law of strife or opposition which manifests itself in the "upward and downward path." At any given moment, each of the three forms of matter, Fire, Water, and Earth, is made up of two equal portions,—subject, of course, to the oscillation described above,—one of which is taking the upward and the other the downward path. Now, it is just the fact that the two halves of everything are being "drawn in opposite directions," this "opposite tension," that "keeps things together," and maintains them in an equilibrium which can only be disturbed temporarily and within certain limits. It thus forms the "hidden attunement" of the universe (fr. 47), though, in another aspect of it, it is Strife. Bernays has pointed out that the word *ἁρμονία* meant originally "structure," and the illustration of the bow and the lyre shows that this idea was present. On the other hand, that taken from the concord of high and low notes shows that the musical sense of the word, namely, an octave, was not wholly absent. As to the "bow and the lyre" (fr. 45), I think that Professor Campbell has best brought out the point of the simile. "As the arrow leaves the string," he says, "the hands are pulling opposite ways to each other, and to the different parts of the bow (cf. Plato, *Rep*. 4. 439); and the sweet note of the lyre is due to a similar tension and retention. The secret of the universe is the same." [1] War, then, is the father and king of all things, in the

[1] Campbell's *Theaetetus* (2nd ed.), p. 244. See above, p. 150, n. 2. Bernays explained the phrase as referring to the *shape* of the bow and lyre, but this is much less likely. Wilamowitz's interpretation is substantially the same as Campbell's. "Es ist mit der Welt wie mit dem Bogen, den man auseinanderzieht, damit er zusammenschnellt, wie mit der Saite, die man ihrer Spannung entgegenziehen muss, damit sie klingt" (*Lesebuch*, ii. p. 129).

world as in human society (fr. 44); and Homer's wish that strife might cease was really a prayer for the destruction of the world (fr. 43).

We know from Philo that Herakleitos supported his theory of the attainment of harmony through strife by a multitude of examples; and, as it happens, some of these can be recovered. There is a remarkable agreement between a passage of this kind in the pseudo-Aristotelian treatise, entitled *The Kosmos*, and the Hippokratean work to which we have already referred. That the authors of both drew from the same source, namely, Herakleitos, is probable in itself, and is made practically certain by the fact that this agreement extends in part to the *Letters of Herakleitos*, which, though spurious, were certainly composed by some one who had access to the original work. The argument was that men themselves act just in the same way as Nature, and it is therefore surprising that they do not recognise the laws by which she works. The painter produces his harmonious effects by the contrast of colours, the musician by that of high and low notes. "If one were to make all things alike, there would be no delight in them." There are many similar examples in the Hippokratean tract, some of which must certainly come from Herakleitos; but it is not easy to separate them from the later additions.[1]

[1] See on all this Patin's *Quellenstudien zu Heraklit* (1881). The sentence (Περὶ διαίτης, i. 5): *καὶ τὰ μὲν πρήσσουσιν οὐκ οἴδασιν, ἃ δὲ οὐ πρήσσουσι δοκέουσιν εἰδέναι· καὶ τὰ μὲν ὁρέουσιν οὐ γινώσκουσιν, ἀλλ' ὅμως αὐτοῖσι πάντα γίνεται . . . καὶ ἃ βούλονται καὶ ἃ μὴ βούλονται*, has the true Herakleitean ring. This, too, can hardly have had another author: "They trust to their eyes rather than to their understanding, though their eyes are not fit to judge even of the things that are seen. But I speak these things from understanding." These words are positively grotesque in the mouth of the medical compiler; but we are accustomed to hear such things from the Ephesian. Other examples which may be Herakleitean are

Correlation of opposites.

80. There are a number of Herakleitean fragments which form a class by themselves, and are among the most striking of all the utterances that have come down to us. Their common characteristic is, that they assert in the most downright way the identity of various things which are usually regarded as opposites. The clue to their meaning is to be found in the account already given of the assertion that day and night are one. We have seen that Herakleitos meant to say, not that day was night or that night was day, but that they were two sides of the same process, namely, the oscillation of the "measures" of fire and water, and that neither would be possible without the other. Any explanation that can be given of night will also be an explanation of day, and *vice versa*; for it will be an account of that which is common to both, and manifests itself now as one and now as the other. Moreover, it is just because it has manifested itself in the one form that it must next appear in the other; for this is required by the law of compensation or Justice.

This is only a particular application of the universal principle that the primary fire is one even in its division. It itself is, even in its unity, both surfeit and want, war and peace (fr. 36). In other words, the "satiety" which makes fire pass into other forms, which makes it seek "rest in change" (frs. 82, 83), and "hide itself" (fr. 10) in the "hidden attunement" of opposition, is only one side of the process. The other is the "want" which leads it to consume the bright vapour as fuel. The upward path is nothing without the down-

the image of the two men sawing wood—"one pushes, the other pulls" —and the illustration from the art of writing.

ward (fr. 69). If either were to cease, the other would cease too, and the world would disappear; for it takes both to make an apparently stable reality.

All other utterances of the kind are to be explained in the same way. If there were no cold, there would be no heat; for a thing can only grow warm if, and in so far as, it is already cold. And the same thing applies to the opposition of wet and dry (fr. 39). These, it will be observed, are just the two primary oppositions of Anaximander, and Herakleitos is showing that the war between them is really peace, for it is the common element in them (fr. 62) which appears as strife, and that very strife is justice, and not, as Anaximander had taught, an injustice which they commit one against the other, and which must be expiated by a reabsorption of both in their common ground.[1] The strife itself is the common ground (fr. 62), and is eternal.

The most startling of these sayings is that which affirms that good and evil are the same (fr. 57). This does not mean in the least, however, that good is evil or that evil is good, but simply that they are the two inseparable halves of one and the same thing. A thing can become good only in so far as it is already evil, and evil only in so far as it is already good, and everything depends on the contrast. The illustration given in fr. 58 shows this clearly. Torture, one would say, was an evil, and yet it is made a good by the presence of another evil, namely, disease; as is shown by the fact that surgeons expect a fee for inflicting it upon their patients. Justice, on the other hand, which is a good, would be altogether unknown were it not for the existence of injustice, which is an evil

[1] Chap. I. § 16.

(fr. 60). And that is why it is not good for men to get everything they wish (fr. 104). Just as the cessation of strife in the world would mean its destruction, so the disappearance of hunger, disease, and weariness would mean the disappearance of satisfaction, health, and rest.

This leads to a theory of relativity which prepares the way for the doctrine of Protagoras, that "Man is the measure of all things."[1] Sea-water is good for fish and bad for men (fr. 52), and so with many other things. At the same time, Herakleitos is not a believer in absolute relativity. The process of the world is not merely a circle, but an "upward and downward path." At the upper end, where the two paths meet, we have the pure fire, in which, as there is no separation, there is no relativity. We are told expressly that, while to man some things are evil and some things are good, all things are good to God (fr. 61). Now by God there is no doubt that Herakleitos meant Fire. He also calls it the "one wise," and perhaps said that it "knows all things." There can hardly be any question that what he meant to say was that in it the opposition and relativity which are universal in the world disappear. It is doubtless to this that frs. 96, 97, and 98 refer.

The Wise. 81. Herakleitos speaks of "wisdom" or the "wise" in two senses. We have seen already that he said wisdom was "something apart from everything else"

[1] Plato's exposition of the relativity of knowledge in the *Theaetetus* (152 d sqq.) can hardly go back to Herakleitos himself, but is meant to show how Herakleiteanism might naturally give rise to such a doctrine. If the soul is a stream and things are a stream, then of course knowledge is relative. Very possibly the later Herakleiteans had worked out the theory in this direction, but in the days of Herakleitos himself the problem of knowledge had not yet arisen.

(fr. 18), meaning by it the perception of the unity of the many; and he also applies the term to that unity itself regarded as the "thought that directs the course of all things." This is synonymous with the pure fire which is not differentiated into two parts, one taking the upward and the other the downward path. That alone has wisdom; the partial things we see have not. We ourselves are only wise in so far as we are fiery (fr. 74).

82. With certain reservations, Herakleitos was prepared to call the one Wisdom by the name of Zeus. Such, at least, appears to be the meaning of fr. 65. What these reservations were, it is easy to guess. It is not, of course, to be pictured in the form of a man. In saying this, Herakleitos would only have been repeating what had already been laid down by Anaximander and Xenophanes. He agrees further with Xenophanes in holding that this "god," if it is to be called so, is one; but his polemic against popular religion was directed rather against the rites and ceremonies themselves than their mere mythological outgrowth. He gives a list (fr. 124) of some of the most characteristic religious figures of his time, and the context in which the fragment is quoted shows that he in some way threatened them with the wrath to come. He comments upon the absurdity of praying to images (fr. 126), and the strange idea that blood-guiltiness can be washed out by the shedding of blood (fr. 130). He seems also to have said that it was absurd to celebrate the worship of Dionysos by cheerful and licentious ceremonies, while Hades was propitiated by gloomy rites (fr. 127). According to the mystic doctrine itself, the two were really one; and the one Wisdom ought to be worshipped in its integrity.

Theology.

The few fragments which deal with theology and religion hardly suggest to us that Herakleitos was in sympathy with the religious revival of the time, and yet we have been asked to consider his system "in the light of the idea of the mysteries."[1] Our attention is called to the fact that he was "king" of Ephesos, that is, priest of the branch of the Eleusinian mysteries established in that city, which was also connected in some way with the worship of Artemis or the Great Mother.[2] These statements may be true; but, even if they are, what follows? We ought surely to have learnt from Lobeck by this time that there was no "idea" in the mysteries at all; and on this point the results of recent anthropological research have abundantly confirmed those of philological and historical inquiry.

Ethics of Herakleitos.

83. The moral teaching of Herakleitos has sometimes been regarded as an anticipation of the "common-sense" theory of Ethics.[3] The "common" upon which Herakleitos insists is, nevertheless, something very different from common sense, for which, indeed, he had the greatest possible contempt (fr. 111). It is, in fact, his strongest objection to "the many," that they live each in his own world (fr. 95), as if they had a private wisdom of their own (fr. 92); and public opinion is therefore just the opposite of "the common."

The Ethics of Herakleitos are to be regarded as a corollary of his anthropological and cosmological views. Their chief requirement is that we keep our

[1] E. Pfleiderer, *Die Philosophie des Heraklit von Ephesus im Lichte der Mysterienidee* (1886).

[2] Antisthenes (the writer of *Successions*) *ap.* Diog. ix. 6 (R. P. 31). Cf. Strabo, xiv. p. 633 (R. P. 31 b).

[3] Köstlin, *Gesch. d. Ethik*, i. pp. 160 sqq.

souls dry, and thus assimilate them to the one Wisdom, which is fire. That is what is really "common," and the greatest fault is to act like men asleep (fr. 94), that is, by letting our souls grow moist, to cut ourselves off from the fire in the world. We do not know what were the consequences which Herakleitos deduced from his rule that we must hold fast to what is common, but it is easy to see what their nature must have been. The wise man would not try to secure good without its correlative evil. He would not seek for rest without exertion, nor expect to enjoy contentment without first suffering discontent. He would not complain that he had to take the bad with the good, but would consistently look at things as a whole.

Herakleitos prepared the way for the Stoic world-state by comparing "the common" to the laws of a city. And these are even more than a type of the divine law: they are imperfect embodiments of it. They cannot, however, exhaust it altogether; for in all human affairs there is an element of relativity (fr. 91). "Man is a baby compared to God" (fr. 97). Such as they are, however, the city must fight for them as for its walls; and, if it has the good fortune to possess a citizen with a dry soul, he is worth ten thousand (fr. 113); for in him alone is "the common" embodied.

CHAPTER IV

PARMENIDES OF ELEA

Life. 84. PARMENIDES, son of Pyres, was a citizen of Hyele, Elea, or Velia, a colony founded in Oinotria by refugees from Phokaia in 540-39 B.C.[1] Diogenes tells us that he "flourished" in Ol. LXIX. (504-500 B.C.), and this was doubtless the date given by Apollodoros.[2] On the other hand, Plato says that Parmenides came to Athens in his sixty-fifth year, accompanied by Zeno, and conversed with Sokrates, who was then quite young. Now Sokrates was just over seventy when he was put to death in 399 B.C.; and therefore, if we suppose him to have been an *ephebos*, that is, from eighteen to twenty years old, at the time of his interview with Parmenides, we get 451-449 B.C. as the date of that event. I do not hesitate to accept Plato's statement,[3] especially as

[1] Diog. ix. 21 (R. P. 111). For the foundation of Elea, see Herod. i. 165 sqq. It was on the coast of Lucania, south of Poseidonia (Paestum).

[2] Diog. ix. 23 (R. P. 111). Cf. Diels, *Rhein. Mus.* xxxi. p. 34; and Jacoby, pp. 231 sqq.

[3] Plato, *Parm.* 127 b (R. P. 111 d). There are, as Zeller has shown, a certain number of anachronisms in Plato, but there is not one of this character. In the first place, we have exact figures as to the ages of Parmenides and Zeno, which imply that the latter was twenty-five years younger than the former, not forty as Apollodoros said. In the second place, Plato refers to this meeting in two other places (*Tht.* 183 e 7 and *Soph.* 217 c 5), which do not seem to be mere references to the dialogue

we have independent evidence of the visit of Zeno to Athens, where Perikles is said to have "heard" him.[1] The date given by Apollodoros, on the other hand, depends solely on that of the foundation of Elea, which he had adopted as the *floruit* of Xenophanes. Parmenides is born in that year, just as Zeno is born in the year when Parmenides "flourished." Why any one should prefer these transparent combinations to the testimony of Plato, I am at a loss to understand, though it is equally a mystery why Apollodoros himself should have overlooked such precise data.

We have seen already (§ 55) that Aristotle mentions a statement which made Parmenides the disciple of Xenophanes; but the value of this testimony is diminished by the doubtful way in which he speaks, and it is more than likely that he is only referring to what Plato says in the *Sophist*.[2] It is, we also saw, very improbable that Xenophanes founded the school of Elea, though it is quite possible he visited that city. He tells us himself that, in his ninety-second year, he was still wandering up and down (fr. 8). At that time Parmenides would be well advanced in life. And we must not overlook the statement of Sotion, preserved to us by Diogenes, that, though Parmenides "heard" Xenophanes, he did not "follow" him. According to this account, our philosopher was the "associate" of a Pythagorean, Ameinias, son of Diochaitas, "a poor but noble man to whom he afterwards built a shrine as to a hero." It was

entitled *Parmenides*. No parallel can be quoted for an anachronism so glaring and deliberate as this would be. E. Meyer (*Gesch. des Alterth.* iv. § 509, *Anm.*) also regards the meeting of Sokrates and Parmenides as historical.

[1] Plut. *Per.* 4, 3. See below, p. 358, n. 2.

[2] See above, Chap. II. p. 140, n. 2.

Ameinias and not Xenophanes that "converted" Parmenides to the philosophic life.[1] This does not read like an invention, and we must remember that the Alexandrians had information about the history of Southern Italy which we have not. The shrine erected by Parmenides would still be there in later days, like the grave of Pythagoras at Metapontion. It should also be mentioned that Strabo describes Parmenides and Zeno as Pythagoreans, and that Kebes talks of a "Parmenidean and Pythagorean way of life."[2] Zeller explains all this by supposing that, like Empedokles, Parmenides approved of and followed the Pythagorean mode of life without adopting the Pythagorean system. It is possibly true that Parmenides believed in a "philosophic life" (§ 35), and that he got the idea from the Pythagoreans; but there is very little trace, either in his writings or in what we are told about him, of his having been in any way affected by the religious side of Pythagoreanism. The writing of Empedokles is obviously modelled upon that of Parmenides, and yet there is an impassable gulf between the two. The touch of charlatanism, which is so strange a feature in the copy, is altogether absent from the model. It is true, no doubt, that there are traces of Orphic ideas in the poem of Parmenides;[3]

[1] Diog. ix. 21 (R. P. 111), reading 'Αμεινίᾳ Διοχαίτα with Diels (*Hermes*, xxxv. p. 197). Sotion, in his *Successions*, separated Parmenides from Xenophanes and associated him with the Pythagoreans (*Dox.* pp. 146, 148, 166).

[2] Strabo, vi. 1, p. 252 (p. 195, n. 1); Ceb. *Tab.* 2 (R. P. 111 c). This Kebes is not the Kebes of the *Phaedo*; but he certainly lived some time before Lucian, who speaks of him as a well-known writer. A Cynic of the name is mentioned by Athenaios (156 d). The statements of Strabo are of the greatest value; for they are based upon historians now lost.

[3] O. Kern in *Arch.* iii. pp. 173 sqq. We know too little, however, of the apocalyptic poems of the sixth century B.C. to be sure of the details. All we can say is that Parmenides has taken the form of his poem from

but they are all to be found either in the allegorical introduction or in the second part of the poem, and we need not therefore take them very seriously. Now Parmenides was a western Hellene, and he had probably been a Pythagorean, so it is not a little remarkable that he should be so free from the common tendency of his age and country. It is here, if anywhere, that we may trace the influence of Xenophanes. As regards his relation to the Pythagorean system, we shall have something to say later on. At present we need only note further that, like most of the older philosophers, he took part in politics; and Speusippos recorded that he legislated for his native city. Others add that the magistrates of Elea made the citizens swear every year to abide by the laws which Parmenides had given them.[1]

85. Parmenides was really the first philosopher to expound his system in metrical language. As there is some confusion on this subject, it deserves a few words of explanation. In writing of Empedokles, Mr. J. A. Symonds said: "The age in which he lived had not yet thrown off the form of poetry in philosophical composition. Even Parmenides had committed his austere theories to hexameter verse." Now this is wrongly put. The earliest philosophers, Anaximander, Anaximenes, and Herakleitos, all wrote in prose, and the only Greeks who ever wrote philosophy in verse **The poem.**

some such source. See Diels, "Ueber die poetischen Vorbilder des Parmenides" (*Berl. Sitzb.* 1896), and the Introduction to his *Parmenides Lehrgedicht*, pp. 9 sqq.

[1] Diog. ix. 23 (R. P. 111). Plut. *adv. Col.* 1226 a, Παρμενίδης δὲ τὴν ἑαυτοῦ πατρίδα διεκόσμησε νόμοις ἀρίστοις, ὥστε τὰς ἀρχὰς καθ' ἕκαστον ἐνιαυτὸν ἐξορκοῦν τοὺς πολίτας ἐμμενεῖν τοῖς Παρμενίδου νόμοις. Strabo, vi. 1. p. 252, (Ἐλέαν) ἐξ ἧς Παρμενίδης καὶ Ζήνων ἐγένοντο ἄνδρες Πυθαγόρειοι. δοκεῖ δέ μοι καὶ δι' ἐκείνους καὶ ἔτι πρότερον εὐνομηθῆναι.

at all were just these two, Parmenides and Empedokles; for Xenophanes was not primarily a philosopher any more than Epicharmos. Empedokles copied Parmenides; and he, no doubt, was influenced by Xenophanes and the Orphics. But the thing was an innovation, and one that did not maintain itself.

The fragments of Parmenides are preserved for the most part by Simplicius, who fortunately inserted them in his commentary, because in his time the original work was already rare.[1] I follow the arrangement of Diels.

(1)

The car that bears me carried me as far as ever my heart desired, since it brought me and set me on the renowned way of the goddess, which alone leads the man who knows through all things. On that way was I borne along; for on it did the wise steeds carry me, drawing my car, and maidens showed the way. And the axle, glowing in the socket—for it was urged round by the whirling wheels at each end—gave forth a sound as of a pipe, when the daughters of the Sun, hasting to convey me into the light, threw back their veils from off their faces and left the abode of Night.

There are the gates of the ways of Night and Day,[2] fitted above with a lintel and below with a threshold of stone. They themselves, high in the air, are closed by mighty doors, and Avenging Justice keeps the keys that fit them. Her did the maidens entreat with gentle words and cunningly persuade to unfasten without demur the bolted bars from the gates. Then, when the doors were thrown back, they disclosed a wide opening, when their brazen posts fitted with rivets and nails swung back one after the other. Straight through them, on the broad way, did the maidens guide the horses and the

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[1] Simpl. *Phys.* 144, 25 (R. P. 117). Simplicius, of course, had the library of the Academy at his command. Diels notes, however, that Proclus seems to have used a different MS.

[2] For these see Hesiod, *Theog.* 748.

car, and the goddess greeted me kindly, and took my right hand in hers, and spake to me these words:

Welcome, O youth, that comest to my abode on the car that bears thee tended by immortal charioteers! It is no ill chance, but right and justice that has sent thee forth to travel on this way. Far, indeed, does it lie from the beaten track of men! Meet it is that thou shouldst learn all things, as well the unshaken heart of well-rounded truth, as the opinions of mortals in which is no true belief at all. Yet none the less shalt thou learn these things also,—how they should have judged that the things which seem to them are,—as thou goest through all things in thy journey.[1]

. . . .

But do thou restrain thy thought from this way of inquiry, nor let habit by its much experience force thee to cast upon this way a wandering eye or sounding ear or tongue; but judge by argument the much disputed proof uttered by me. There is only one way left that can be spoken of.[2] . . . R. P. 113.

The Way of Truth

(2)

Look steafdastly with thy mind at things though afar as if they were at hand. Thou canst not cut off what is from holding fast to what is, neither scattering itself abroad in order nor coming together. R. P. 118 a.

(3)

It is all one to me where I begin; for I shall come back again there.

(4, 5)

Come now, I will tell thee—and do thou hearken to my saying and carry it away—the only two ways of search that can be thought of. The first, namely, that *It is*, and that it is impossible for it not to be, is the way of belief, for truth is

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1 See below, p. 211, n. 1.

2 I read μῦθος as in the parallel passage fr. 8 *ad init.* Diels's interpretation of θυμὸς ὁδοῖο (the MS. reading here) as *ein lebendiger Weg* does not convince me, and the confusion of the two words is fairly common.

its companion. The other, namely, that *It is not*, and that it must needs not be,—that, I tell thee, is a path that none can learn of at all. For thou canst not know what is not—that is impossible—nor utter it; for it is the same thing that can be thought and that can be.[1] R. P. 114.

(6)

It needs must be that what can be thought and spoken of is; for it is possible for it to be, and it is not possible for what is nothing to be.[2] This is what I bid thee ponder. I hold thee back from this first way of inquiry, and from this other also, upon which mortals knowing naught wander two-faced; for helplessness guides the wandering thought in their breasts, so that they are borne along stupefied like men deaf and blind. Undiscerning crowds, in whose eyes it is, and is not, the same and not the same,[3] and all things travel in opposite directions![4] R. P. 115.

(7)

For this shall never be proved, that the things that are not

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[1] I read with Zeller (p. 558 n. 1, Eng. trans. p. 584, n. 1) *τὸ γὰρ αὐτὸ νοεῖν ἔστιν τε καὶ εἶναι.* Apart from the philosophical anachronism of making Parmenides say that "thought and being are the same," it is a grammatical anachronism to make him use the infinitive (with or without the article) as the subject of a sentence. On the other hand, he does use the active infinitive after *εἶναι* in the construction where we usually use a passive infinitive (Monro, *H. Gr.* § 231 *sub fin.*). Cf. fr. 4, *εἰσὶ νοῆσαι*, "are for thinking," *i.e.* "can be thought."

[2] The construction here is the same as that explained in the last note. It is surprising that good scholars should acquiesce in the translation of *τὸ λέγειν τε νοεῖν τε* as "to say and think this." Then *ἔστι γὰρ εἶναι* means "it can be," not "being is," and the last phrase should be construed *οὐκ ἔστι μηδὲν (εἶναι).*

[3] I construe *οἷς νενόμισται τὸ πέλειν τε καὶ οὐκ εἶναι ταὐτὸν καὶ οὐ ταὐτόν.* The subject of the infinitives *πέλειν καὶ οὐκ εἶναι* is the *it*, which has to be supplied also with *ἔστιν* and *οὐκ ἔστιν.* This way of taking the words makes it unnecessary to believe that Parmenides said (*τὸ*) *οὐκ εἶναι* instead of (*τὸ*) *μὴ εἶναι* for "not-being." There is no difference between *πέλειν* and *εἶναι* except in rhythmical value.

[4] I take *πάντων* as neuter and understand *παλίντροπος κέλευθος* as equivalent to the *ὁδὸς ἄνω κάτω* of Herakleitos. I do not think it has anything to do with the *παλίντονος* (or *παλίντροπος*) *ἁρμονίη*. See Chap. III. p. 150, n. 2.

are; and do thou restrain thy thought from this way of inquiry. R. P. 116.

(8)

One path only is left for us to speak of, namely, that *It is*. In it are very many tokens that what is is uncreated and indestructible; for it is complete,[1] immovable, and without end. Nor was it ever, nor will it be; for now *it is*, all at once, a continuous one. For what kind of origin for it wilt thou look for? In what way and from what source could it have drawn its increase? I shall not let thee say nor think that it came from what is not; for it can neither be thought nor uttered that anything is not. And, if it came from nothing, what need could have made it arise later rather than sooner? Therefore must it either be altogether or be not at all. Nor will the force of truth suffer aught to arise besides itself from that which is not.[2] Wherefore, Justice doth not loose her fetters and let anything come into being or pass away, but holds it fast. Our judgment thereon depends on this: "*Is it* or *is it not*?" Surely it is adjudged, as it needs must be, that we are to set aside the one way as unthinkable and nameless (for it is no true way), and that the other path is real and true. How, then, can what *is* be going to be in the future? Or how could it come into being? If it came into being, it is not; nor is it if it is going to be in the future. Thus is becoming extinguished and passing away not to be heard of. R. P. 117.

Nor is it divisible, since it is all alike, and there is no more[3]

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[1] I still prefer to read ἔστι γὰρ οὐλομελές with Plutarch (*adv. Col.* 1114 c). Proklos (*in Parm.* 1152, 24) also read οὐλομελές. Simplicius, who has μουνογενές here, calls the One of Parmenides ὁλομελές elsewhere (*Phys.* p. 137, 15). The reading of [Plut.] *Strom.* 5, μοῦνον μουνογενές helps to explain the confusion. We have only to suppose that the letters μ, ν, γ were written above the line in the Academy copy of Parmenides by some one who had *Tim.* 31 b 3 in mind.

[2] Diels formerly read ἔκ πη ἐόντος, "from that which in any way is"; but he has now reverted to the reading ἐκ μὴ ἐόντος, supposing that the other horn of the dilemma has dropped out. In any case, "nothing but what is not can arise from what is not" gives a perfectly good sense.

[3] For the difficulties which have been felt about μᾶλλον here, see Diels's note. If the word is to be pressed, his interpretation is admissible; but it

of it in one place than in another, to hinder it from holding together, nor less of it, but everything is full of what is. Wherefore it is wholly continuous; for what is, is in contact with what is.

Moreover, it is immovable in the bonds of mighty chains, without beginning and without end; since coming into being and passing away have been driven afar, and true belief has cast them away. It is the same, and it rests in the self-same place, abiding in itself. And thus it remaineth constant in its place; for hard necessity keeps it in the bonds of the limit that holds it fast on every side. Wherefore it is not permitted to what is to be infinite; for it is in need of nothing; while, if it were infinite, it would stand in need of everything.[1] R. P. 118.

The thing that can be thought and that for the sake of which the thought exists is the same;[2] for you cannot find thought without something that is, as to which it is uttered.[3] And there is not, and never shall be, anything besides what is, since fate has chained it so as to be whole and immovable. Wherefore all these things are but names which mortals have given, believing them to be true—coming into being and passing away, being and not being, change of place and alteration of bright colour. R. P. 119.

Since, then, it has a furthest limit, it is complete on every side, like the mass of a rounded sphere, equally poised from the centre in every direction; for it cannot be greater or smaller in one place than in another. For there is no nothing

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seems to me that this is simply an instance of "polar expression." It is true that it is only the case of there being less of what is in one place than another that is important for the divisibility of the One; but if there is less in one place, there is more in another *than in that place.* The Greek language tends to express these implications. The position of the relative clause makes a difficulty for us, but hardly for a Greek.

[1] Simplicius certainly read *μὴ ἐὸν δ' ἂν παντὸς ἐδεῖτο*, which is metrically impossible. I have followed Bergk in deleting *μή*, and have interpreted with Zeller. So too Diels.

[2] For the construction of *ἔστι νοεῖν*, see above, p. 198, n. 1.

[3] As Diels rightly points out, the Ionic *φατίζειν* is equivalent to *ὀνομάζειν*. The meaning, I think, is this. We may name things as we choose, but there can be no thought corresponding to a name that is not the name of something real.

that could keep it from reaching out equally, nor can aught that is be more here and less there than what is, since it is all inviolable. For the point from which it is equal in every direction tends equally to the limits. R. P. 120.

The Way of Opinion

Here shall I close my trustworthy speech and thought about the truth. Henceforward learn the opinions of mortals, giving ear to the deceptive ordering of my words.

Mortals have made up their minds to name two forms, one of which they should not name,[1] and that is where they go astray from the truth. They have distinguished them as opposite in form, and have assigned to them marks distinct from one another. To the one they allot the fire of heaven, gentle, very light, in every direction the same as itself, but not the same as the other. The other is just the opposite to it, dark night, a compact and heavy body. Of these I tell thee the whole arrangement as it seems likely; for so no thought of mortals will ever outstrip thee. R. P. 121.

(9)

Now that all things have been named light and night, and the names which belong to the power of each have been assigned to these things and to those, everything is full at once of light and dark night, both equal, since neither has aught to do with the other.

(10, 11)

And thou shalt know the substance of the sky, and all the signs in the sky, and the resplendent works of the glowing sun's pure torch, and whence they arose. And thou shalt learn likewise of the wandering deeds of the round-faced moon, and

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[1] This is Zeller's way of taking the words, and still seems to me the best. Diels objects that ἑτέρην would be required, and renders *nur eine derselben*, *das sei unerlaubt*, giving the words to the "mortals." This seems to me to involve more serious grammatical difficulties than the use of *μίαν* for *τὴν ἑτέραν*, which is quite legitimate when there is an emphasis on the number. Aristotle must have taken it so; for he infers that one of the *μορφαί* is to be identified with *τὸ ἐόν*.

of her substance. Thou shalt know, too, the heavens that surround us, whence they arose, and how Necessity took them and bound them to keep the limits of the stars . . . how the earth, and the sun, and the moon, and the sky that is common to all, and the Milky Way, and the outermost Olympos, and the burning might of the stars arose. R. P. 123, 124.

(12)

The narrower rings are filled with unmixed fire, and those next them with night, and in the midst of these rushes their portion of fire. In the midst of these circles is the divinity that directs the course of all things; for she is the beginner of all painful birth and all begetting, driving the female to the embrace of the male, and the male to that of the female. R. P. 125.

(13)

First of all the gods she contrived Eros. R. P. 125.

(14)

Shining by night with borrowed light,[1] wandering round the earth.

(15)

Always looking to the beams of the sun.

(16)

'For just as thought finds at any time the mixture of its erring organs, so does it come to men; for that which thinks is the same, namely, the substance of the limbs, in each and every man; for their thought is that of which there is more in them.[2] R. P. 128.

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[1] Note the curious echo of *Il.* v. 214. Empedokles has it too (v. 154). It appears to be a joke, made in the spirit of Xenophanes, when it was first discovered that the moon shone by reflected light.

[2] This fragment of the theory of knowledge which was expounded in the second part of the poem of Parmenides must be taken in connexion with what we are told by Theophrastos in the "Fragment on Sensation" (*Dox.* p. 499; cf. p. 222). It appears from this that he said the character of men's thought depended upon the preponderance of the light or the dark element in their bodies. They are wise when the light element predominates, and foolish when the dark gets the upper hand.

(17)

On the right boys; on the left girls.[1]

(19)

Thus, according to men's opinions, did things come into being, and thus they are now. In time they will grow up and pass away. To each of these things men have assigned a fixed name. R. P. 129 b.

86. In the First Part of his poem, we find Parmenides chiefly interested to prove that *it is*; but it is not quite obvious at first sight what it is precisely that *is*. He says simply, *What is, is*. To us this does not seem very clear, and that for two reasons. In the first place, we should never think of doubting it, and we cannot, therefore, understand why it should be asserted with such iteration and vigour. In the second place, we are accustomed to all sorts of distinctions between different kinds and degrees of reality, and we do not see which of these is meant. Such distinctions, however, were quite unknown in those days. "That which is," with Parmenides, is primarily what, in popular language, we call matter or body; only it is not matter as distinguished from anything else. It is certainly regarded as spatially extended; for it is quite seriously spoken of as a sphere (fr. 8, 40). Moreover, Aristotle tells us that Parmenides believed in none but a sensible reality, which does not necessarily mean with him a reality that is actually perceived by the senses, but includes any which might be so perceived if the senses were more perfect than they are.[2] Parmenides "It is."

[1] This is a fragment of Parmenides's embryology. Diels's fr. 18 is a retranslation of the Latin hexameters of Caelius Aurelianus quoted R. P. 127 a.

[2] Arist. *de Caelo*, Γ, 1. 298 b 21, *ἐκεῖνοι δὲ (οἱ περὶ Μέλισσόν τε καὶ Παρμενίδην) διὰ τὸ μηθὲν μὲν ἄλλο παρὰ τὴν τῶν αἰσθητῶν οὐσίαν*

does not say a word about "Being" anywhere.[1] The assertion that *it is* amounts just to this, that the universe is a *plenum*; and that there is no such thing as empty space, either inside or outside the world. From this it follows that there can be no such thing as motion. Instead of endowing the One with an impulse to change, as Herakleitos had done, and thus making it capable of explaining the world, Parmenides dismissed change as an illusion. He showed once for all that if you take the One seriously you are bound to deny everything else. All previous solutions of the question, therefore, had missed the point. Anaximenes, who thought to save the unity of the primary substance by his theory of rarefaction and condensation, did not observe that, by assuming there was less of what is in one place than another, he virtually affirmed the existence of what is not (fr. 8, 42). The Pythagorean explanation implied that empty space or air existed outside the world, and that it entered into it to separate the units (§ 53). It, too, assumes the existence of what is not. Nor is the theory of Herakleitos any more satisfactory; for it is based upon the contradiction that fire both is and is not (fr. 6).

The allusion to Herakleitos in the verses last referred

ὑπολαμβάνειν εἶναι κ.τ.λ. So too Eudemos, in the first book of his Physics (*ap.* Simpl. *Phys.* p. 133, 25), said of Parmenides: *τὸ μὲν οὖν κοινὸν οὐκ ἂν λέγοι. οὔτε γὰρ ἐζητεῖτό πω τὰ τοιαῦτα, ἀλλ' ὕστερον ἐκ τῶν λόγων προῆλθεν, οὔτε ἐπιδέχοιτο ἂν ἃ τῷ ὄντι ἐπιλέγει. πῶς γὰρ ἔσται τοῦτο "μέσσοθεν ἰσοπαλὲς" καὶ τὰ τοιαῦτα; τῷ δὲ οὐρανῷ* (the world) *σχεδὸν πάντες ἐφαρμόσουσιν οἱ τοιοῦτοι λόγοι.* The Neoplatonists, of course, saw in the One the *νοητὸς κόσμος*, and Simplicius calls the sphere a "mythical figment." See especially Baümker, "Die Einheit des Parmenideischen Seiendes" (*Jahrb. f. kl. Phil.* 1886, pp. 541 sqq.), and *Das Problem der Materie*, pp. 50 sqq.

[1] We must not render *τὸ ἐόν* by "Being," *das Sein* or *l'être*. It is "what is," *das Seiende, ce qui est*. As to (*τὸ*) *εἶναι* it does not, and could not, occur. Cf. p. 198, n. 1, above.

to has been doubted, though upon insufficient grounds. Zeller points out quite rightly that Herakleitos never says Being and not-Being are the same (the common translation of fr. 6, 8); and, were there nothing more than this, the reference might well seem doubtful. The statement, however, that, according to the view in question, "all things travel in opposite directions," can hardly be understood of anything but the "upward and downward path" of Herakleitos (§ 71). And, as we have seen, Parmenides does not attribute the view that Being and not-Being are the same to the philosopher whom he is attacking; he only says that *it* is and is not, the same and not the same.[1] That is the natural meaning of the words; and it furnishes a very accurate description of the theory of Herakleitos.

The method of Parmenides.

87. The great novelty in the poem of Parmenides is the method of argument. He first asks what is the common presupposition of all the views with which he has to deal, and he finds that this is the existence of what is not. The next question is whether this can be thought, and the answer is that it cannot. If you think at all, you must think of something. Therefore there is no nothing. Philosophy had not yet learned to make the admission that a thing might be unthinkable and nevertheless exist. Only that can be which can be thought (fr. 5); for thought exists for the sake of what is (fr. 8, 34).

This method Parmenides carries out with the utmost rigour. He will not have us pretend that we think what we must admit to be unthinkable. It is true that if we resolve to allow nothing but what we can understand, we come into direct conflict with the evidence

[1] See above, p. 198, n. 3.

of our senses, which present us with a world of change and decay. So much the worse for the senses, says Parmenides. To many this will doubtless seem a mistake on his part, but let us see what history has to say on the point. The theory of Parmenides is the inevitable outcome of a corporeal monism, and his bold declaration of it ought to have destroyed that theory for ever. If he had lacked courage to work out the prevailing views of his time to their logical conclusion, and to accept that conclusion, however paradoxical it might seem to be, men might have gone on in the endless circle of opposition, rarefaction and condensation, one and many, for ever. It was the thoroughgoing dialectic of Parmenides that made progress possible. Philosophy must now cease to be monistic or cease to be corporealist. It could not cease to be corporealist; for the incorporeal was still unknown. It therefore ceased to be monistic, and arrived at the atomic theory, which, so far as we know, is the last word of the view that the world is matter in motion. Having worked out its problems on those conditions, philosophy next attacked them on the other side. It ceased to be corporealist, and found it possible to be monistic once more, at least for a time. This progress would have been impossible but for that faith in reason which gave Parmenides the courage to reject as untrue what was to him unthinkable, however strange the result might be.

The results. 88. He goes on to develop all the consequences of the admission that *it is*. It must be uncreated and indestructible. It cannot have arisen out of nothing; for there is no such thing as nothing. Nor can it have arisen from something; for there is no room for any-

thing but itself. What is cannot have beside it any empty space in which something else might arise; for empty space is nothing, nothing cannot be thought, and therefore cannot exist. What is, never came into being, nor is anything going to come into being in the future. "Is it or is it not?" If it is, then it is now, all at once.

That Parmenides was really denying the existence of empty space was quite well known to Plato. He says that Parmenides held "all things were one, and that the one remains at rest in itself, *having no place in which to move*."[1] Aristotle is no less clear. In the *de Caelo* he lays it down that Parmenides was driven to take up the position that the One was immovable just because no one had yet imagined that there was any reality other than sensible reality.[2]

That which is, is; and it cannot be more or less. There is, therefore, as much of it in one place as in another, and the world is a continuous, indivisible *plenum*. From this it follows at once that it must be immovable. If it moved, it must move into an empty space, and there is no empty space. It is hemmed in by *what is*, by the real, on every side. For the same reason, it must be finite, and can have nothing beyond it. It is complete in itself, and has no need to stretch out indefinitely into an empty space that does not exist. Hence, too, it is spherical. It is equally real in every direction, and the sphere is the only form which meets this condition. Any other would *be* in one direction more than in another. And this sphere cannot even

[1] Plato, *Tht.* 180 e 3, ὡς ἕν τε πάντα ἐστὶ καὶ ἕστηκεν αὐτὸ ἐν αὑτῷ οὐκ ἔχον χώραν ἐν ᾗ κινεῖται.

[2] Arist. *de Caelo*, Γ, 1. 298 b 21, quoted above, p. 203, n. 2.

move round its own axis; for there is nothing outside of it with reference to which it could be said to move.

Parmenides the father of materialism.

89. To sum up. What *is*, is a finite, spherical, motionless corporeal *plenum*, and there is nothing beyond it. The appearances of multiplicity and motion, empty space and time, are illusions. We see from this that the primary substance of which the early cosmologists were in search has now become a sort of "thing in itself." It never quite lost this character again. What appears later as the elements of Empedokles, the so-called "homoeomeries" of Anaxagoras and the atoms of Leukippos and Demokritos, is just the Parmenidean "being." Parmenides is not, as some have said, the "father of idealism"; on the contrary, all materialism depends on his view of reality.

The beliefs of "mortals."

90. It is commonly said that, in the Second Part of his poem, Parmenides offered a dualistic theory of the origin of things as his own conjectural explanation of the sensible world, or that, as Gomperz says, "What he offered were the Opinions of Mortals; and this description did not merely cover other people's opinions. It included his own as well, as far as they were not confined to the unassailable ground of an apparent philosophical necessity."[1] Now it is true that in one place Aristotle appears to countenance a view of this sort, but nevertheless it is an anachronism.[2] Nor is it really Aristotle's view. He was perfectly well aware

[1] *Greek Thinkers*, pp. 180 sqq.

[2] *Met.* A, 5. 986 b 31 (R. P. 121 a). Aristotle's way of putting the matter is due to his interpretation of fr. 8, 54, which he took to mean that one of the two "forms" was to be identified with *τὸ ὄν* and the other with *τὸ μὴ ὄν*. Cf. *Gen. Corr.* A, 3. 318 b 6, *ὥσπερ Παρμενίδης λέγει δύο, τὸ ὂν καὶ τὸ μὴ ὂν εἶναι φάσκων*. This last sentence shows clearly that when Aristotle says *Παρμενίδης*, he means what we should call "Parmenides." He cannot have supposed that Parmenides admitted the being of *τὸ μὴ ὄν* in any sense whatever (cf. Plato, *Soph.* 241 d 5).

that Parmenides did not admit the existence of "not-being" in any degree whatever; but it was a natural way of speaking to call the cosmology of the Second Part of the poem that of Parmenides. His hearers would understand at once in what sense this was meant. At any rate, the Peripatetic tradition was that Parmenides, in the Second Part of the poem, meant to give the belief of "the many." This is how Theophrastos put the matter, and Alexander seems to have spoken of the cosmology as something which Parmenides himself regarded as wholly false.[1] The other view comes from the Neoplatonists, and especially Simplicius, who very naturally regarded the Way of Truth as an account of the intelligible world, and the Way of Opinion as a description of the sensible. It need hardly be said that this is almost as great an anachronism as the Kantian parallelism suggested by Gomperz.[2] Parmenides himself tells us in the most unequivocal language that there is no truth at all in the theory which he expounds, and he gives it merely as the belief of "mortals." It was this that led Theophrastos to speak of it as the opinion of "the many."

His explanation however, though preferable to that of Simplicius, is not convincing either. "The many"

[1] Theophr. *Phys. Op.* fr. 6 (*Dox.* p. 482; R. P. 121 a), *κατὰ δόξαν δὲ τῶν πολλῶν εἰς τὸ γένεσιν ἀποδοῦναι τῶν φαινομένων δύο ποιῶν τὰς ἀρχάς.* For Alexander cf. Simpl. *Phys.* p. 38, 24.

[2] Simpl. *Phys.* p. 39, 10 (R. P. 121 b). Gomperz, *Greek Thinkers*, p. 180. E. Meyer says (*Gesch. des Alterth.* iv. § 510, *Anm.*): "How too can we think that a teacher of wisdom taught his disciples nothing as to the way in which they must take the existing sensible world, even if only as a deception?" This implies (1) that the distinction between Appearance and Reality had been clearly grasped; and (2) that a certain hypothetical and relative truth was allowed to Appearance. These are palpable anachronisms. Both views are Platonic, and they were not held even by Plato in his earlier writings.

are as far as possible from believing in an elaborate dualism such as Parmenides expounded, and it is a highly artificial hypothesis to assume that he wished to show how the popular view of the world could best be systematised. "The many" would hardly be convinced of their error by having their beliefs presented to them in a form which they would certainly fail to recognise. This, indeed, seems the most incredible interpretation of all. It still, however, finds adherents, so it is necessary to point out that the beliefs in question are called "the opinions of mortals" simply because the speaker is a goddess. Further, we have to note that Parmenides forbids two ways of research, and we have seen that the second of these, which is also expressly ascribed to "mortals," must be the system of Herakleitos. We should surely expect, then, to find that the other way too is the system of some contemporary school, and it seems hard to discover any of sufficient importance except the Pythagorean. Now it is admitted by every one that there are Pythagorean ideas in the Second Part of the poem, and it is therefore to be presumed, in the absence of evidence to the contrary, that the whole system comes from the same source. It does not appear that Parmenides said any more about Herakleitos than the words to which we have just referred, in which he forbids the second way of inquiry. He implies, indeed, that there are really only two ways that can be thought of, and that the attempt of Herakleitos to combine them was futile.[1] In any case, the Pythagoreans

[1] Cf. frs. 4 and 6, especially the words *αἵπερ ὁδοὶ μοῦναι διζήσιός εἰσι νοῆσαι*. The third way, that of Herakleitos, is only added as an afterthought—*αὐτὰρ ἔπειτ' ἀπὸ τῆς κ.τ.λ.*

were far more serious opponents at that date in Italy, and it is certainly to them that we should expect Parmenides to define his attitude.

It is still not quite clear, however, why he should have thought it worth while to put into hexameters a view which he believed to be false. Here it becomes important to remember that he had been a Pythagorean himself, and that the poem is a renunciation of his former beliefs. In such cases men commonly feel the necessity of showing where their old views were wrong. The goddess tells him that he must learn of those beliefs also "how men ought to have judged that the things which seem to them really are."[1] That is clear so far; but it does not explain the matter fully. We get a further hint in another place. He is to learn these beliefs "in order that no opinion of mortals may ever get the better of him" (fr. 8, 61). If we remember that the Pythagorean system at this time was handed down by oral tradition alone, we shall perhaps see what this means. Parmenides was founding a dissident school, and it was quite necessary for him to instruct his disciples in the system they might be called upon to oppose. In any case, they could not reject it intelligently without a knowledge of it, and this Parmenides had to supply himself.[2]

[1] I read *χρῆν δοκιμῶσ' εἶναι* in fr. 1, 32 with Diels, but I do not feel able to accept his rendering *wie man bei gründlicher Durchforschung annehmen müsste, dass sich jenes Scheinwesen verhalte.* We must, I think, take *χρῆν δοκιμῶσαι* (*i.e. δοκιμάσαι*) quite strictly, and *χρῆν* with the infinitive means "ought to have." The most natural subject for the infinitive in that case is *βροτούς*, while *εἶναι* will be dependent on *δοκιμῶσαι*, and have *τὰ δοκοῦντα* for its subject. This way of taking the words is confirmed by fr. 8, 54, *τῶν μίαν οὐ χρεών ἐστιν*, if taken as I have taken it with Zeller. See above, p. 201, n. 1.

[2] The view that the opinions contained in the Second Part are those of others, and are not given as true in any sense whatsoever, is that of Diels. The objections of Wilamowitz (*Hermes*, xxxiv. pp. 203 sqq.) do not appear

The dualist cosmology.

91. The view that the Second Part of the poem of Parmenides was a sketch of contemporary Pythagorean cosmology is, doubtless, incapable of rigorous demonstration, but it can, I think, be made extremely probable. The entire history of Pythagoreanism up to the end of the fifth century B.C. is certainly conjectural; but, if we find in Parmenides ideas which are wholly unconnected with his own view of the world, and if we find precisely the same ideas in later Pythagoreanism, the most natural inference will surely be that the later Pythagoreans derived these views from their predecessors, and that they formed part of the original stock-in-trade of the society to which they belonged. This will only be confirmed if we find that they are developments of certain features in the old Ionian cosmology. Pythagoras came from Samos, which always stood in the closest relations with Miletos; and it was not, so far as we can see, in his cosmological views that he chiefly displayed his originality. It has been pointed out above (§ 53) that the idea of the world breathing came from Anaximenes, and we need not be surprised to find traces of Anaximander as well. Now, if we were

to me cogent. If we interpret him rightly, Parmenides never says that "this hypothetical explanation is . . . better than that of any one else" (E. Meyer, iv. § 510, *Anm.*). What he does say is that it is untrue altogether. It seem to me, however, that Diels has weakened his case by refusing to identify the theory here expounded with Pythagoreanism, and referring it mainly to Herakleitos. Herakleitos was emphatically *not* a dualist, and I cannot see that to represent him as one is even what Diels calls a "caricature" of his theory. Caricatures must have some point of likeness. It is still more surprising to me that Patin, who makes ἓν πάντα εἶναι the corner-stone of Herakleiteanism, should adopt this view (*Parmenides im Kampfe gegen Heraklit*, 1899). E. Meyer (*loc. cit.*) seems to think that the fact of Zeno's having modified the δόξα of Parmenides in an Empedoklean sense (Diog. ix. 29; R.P. 140) proves that it was supposed to have some sort of truth. On the contrary, it would only show, if true, that Zeno had other opponents to face than Parmenides had.

confined to what Aristotle tells us on this subject, it would be almost impossible to make out a case; but his statements require, as usual, to be examined with a certain amount of care. He says, first of all, that the two elements of Parmenides were the Warm and the Cold.[1] In this he is so far justified by the fragments that, since the Fire of which Parmenides speaks is, of course, warm, the other "form," which has all the opposite qualities, must of necessity be cold. But, nevertheless, the habitual use of the terms "*the* warm" and "*the* cold" is an accommodation to Aristotle's own system. In Parmenides himself they were simply one pair of attributes amongst others.

Still more misleading is Aristotle's identification of these with Fire and Earth. It is not quite certain that he meant to say Parmenides himself made this identification; but, on the whole, it is most likely that he did, and Theophastros certainly followed him in this.[2] It is another question whether it is accurate. Simplicius, who had the poem before him (§ 85), after mentioning Fire and Earth, at once adds "or rather Light and Darkness";[3] and this is suggestive enough. Lastly, Aristotle's identification of the dense element with "what is not,"[4] the unreal of the First Part of the poem, is not very easy to reconcile with the view that it is

[1] *Met.* A, 5. 986 b 34, *θερμὸν καὶ ψυχρόν*; *Phys.* A, 5. 188 a 20; *Gen. Corr.* A, 3. 318 b 6; B, 3. 330 b 14.

[2] *Phys.* A, 5. 188 a 21, *ταῦτα δὲ (θερμὸν καὶ ψυχρὸν) προσαγορεύει πῦρ καὶ γῆν*; *Met.* A, 5. 986 b 34, *οἷον πῦρ καὶ γῆν λέγων*. Cf. Theophr. *Phys. Op.* fr. 6 (*Dox.* p. 482; R. P. 121 a). [Plut.] *Strom.* fr. 5 (*Dox.* p. 581), *λέγει δὲ τὴν γῆν τοῦ πυκνοῦ καταρρυέντος ἀέρος γεγονέναι.* Zeller, p. 568, n. 1 (Eng. trans. p. 593, n. 2).

[3] *Phys.* p. 25, 15, *ὡς Παρμενίδης ἐν τοῖς πρὸς δόξαν πῦρ καὶ γῆν (ἢ μᾶλλον φῶς καὶ σκότος).*

[4] *Met.* A, 5. 986 b 35, *τούτων δὲ κατὰ μὲν τὸ ὂν τὸ θερμὸν τάττει, θάτερον δὲ κατὰ τὸ μὴ ὄν.* See above, p. 208, n. 2.

earth. On the other hand, if we suppose that the second of the two "forms," the one which should not have been "named," is the Pythagorean Air or Void, we get a very good explanation of Aristotle's identification of it with "what is not." We seem, then, to be justified in neglecting the identification of the dense element with earth for the present. At a later stage, we shall be able to see how it may have originated.[1] The further statement of Theophrastos, that the Warm was the efficient cause and the Cold the material or passive,[2] is intelligible enough if we identify them with the Limit and the Unlimited respectively; but is not, of course, to be regarded as historical.

We have seen that Simplicius, with the poem of Parmenides before him, corrects Aristotle by substituting Light and Darkness for Fire and Earth, and in this he is amply borne out by the fragments which he quotes. Parmenides himself calls one "form" Light, Flame, and Fire, and the other Night, and we have now to consider whether these can be identified with the Pythagorean Limit and Unlimited. We have seen good reason to believe (§ 58) that the idea of the world breathing belonged to the earliest form of Pythagoreanism, and there can be no difficulty in identifying this "boundless breath" with Darkness, which stands very well for the Unlimited. "Air" or mist was always regarded as the dark element.[3] And that which gives definite-

[1] See below, Chap. VII. § 147.

[2] Theophr. *Phys. Op.* fr. 6 (*Dox.* p. 482; R. P. 121 a), followed by the doxographers.

[3] Note the identification of the dense element with "air" in [Plut.] *Strom.*, quoted p. 213, n. 2; and for the identification of this "air" with "mist and darkness," cf. Chap. I. § 27, and Chap. V. § 107. It is to be observed further that Plato puts this last identification into the mouth of a Pythagorean (*Tim.* 52 d).

ness to the vague darkness is certainly light or fire, and this may account for the prominence given to that element by Hippasos.[1] We may probably conclude, then, that the Pythagorean distinction between the Limit and the Unlimited, which we shall have to consider later (Chap. VII.), made its first appearance in this crude form. If, on the other hand, we identify darkness with the Limit, and light with the Unlimited, as most critics do, we get into insuperable difficulties.

92. We must now look at the general cosmical view expounded in the Second Part of the poem. The fragments are scanty, and the doxographical tradition hard to interpret; but enough remains to show that here, too, we are on Pythagorean ground. All discussion of the subject must start from the following important passage of Aetios :— The heavenly bodies.

Parmenides held that there were crowns crossing one another[2] and encircling one another, formed of the rare and the dense element respectively, and that between these there were other mixed crowns made up of light and darkness. That which surrounds them all was solid like a wall, and under it is a fiery crown. That which is in the middle of all the crowns is also solid, and surrounded in turn by a fiery circle. The central circle of the mixed crowns is the cause of movement and becoming to all the rest. He calls it "the goddess who directs their course," "the Holder of Lots," and "Necessity." Aet. ii. 7. 1 (R. P. 126).

93. The first thing we have to observe is that it is quite unjustifiable to regard these "crowns" as spheres. The word στέφαναι can mean "rims" or "brims" or anything of that sort, but it seems incredible that it The "crowns."

[1] See above, p. 121.

[2] It seems most likely that ἐπαλλήλους here means "crossing one another," as the Milky Way crosses the Zodiac. The term ἐπάλληλος is opposed to παράλληλος.

should be used of spheres. It does not appear, either, that the solid circle which surrounds all the crowns is to be regarded as spherical. The expression "like a wall" would be highly inappropriate in that case. We seem, then, to be face to face with something of the same kind as the "wheels" of Anaximander, and it is obviously quite likely that Pythagoras should have taken this theory from him. Nor is evidence altogether lacking that the Pythagoreans did regard the heavenly bodies in this way. In Plato's Myth of Er, which is certainly Pythagorean in its general character, we do not hear of spheres, but of the "lips" of concentric whorls fitted into one another like a nest of boxes.[1] Even in the *Timaeus* there are no spheres, but bands or strips crossing each other at an angle.[2] Lastly, in the Homeric *Hymn to Ares*, which seems to have been composed under Pythagorean influence, the word used for the orbit of the planet is *ἄντυξ*, which must mean "rim."[3]

The fact is, there is really no evidence that any one ever adopted the theory of celestial spheres at all, till Aristotle turned the geometrical construction which Eudoxos had set up as a hypothesis "to save appearances" (*σῴζειν τὰ φαινόμενα*) into real things.[4]

[1] *Rep.* x. 616 d 5, *καθάπερ οἱ κάδοι οἱ εἰς ἀλλήλους ἁρμόττοντες*; e 1, *κύκλους ἄνωθεν τὰ χείλη φαίνοντας* (*σφονδύλους*).

[2] *Tim.* 36 b 6, *ταύτην οὖν τὴν σύστασιν πᾶσαν διπλῆν κατὰ μῆκος σχίσας, μέσην πρὸς μέσην ἑκατέραν ἀλλήλαις οἷον χεῖ* (the letter X) *προσβαλὼν κατέκαμψεν εἰς ἓν κύκλῳ.*

[3] *Hymn to Ares*, 6:

πυραυγέα κύκλον ἑλίσσων
αἰθέρος ἑπταπόροις ἐνὶ τείρεσιν, ἔνθα σε πῶλοι
ζαφλεγέες τριτάτης ὑπὲρ ἄντυγος αἰὲν ἔχουσι.

So, in allusion to an essentially Pythagorean view, Proclus says to the planet Venus (h. iv. 17):

εἴτε καὶ ἑπτὰ κύκλων ὑπὲρ ἄντυγας αἰθέρα ναίεις.

[4] On the concentric spheres of Eudoxos, see Dreyer, *Planetary Systems*,

From that time forward we hear a great deal about spheres, and it was natural that later writers should attribute them to the Pythagoreans; but there is no occasion to do violence to the language of Parmenides by turning his "crowns" into anything of the sort. At this date, spheres would not have served to explain anything that could not be explained more simply without them.

We are next told that these "crowns" encircle one another or are folded over one another, and that they are made of the rare and the dense element. We also learn that between them are "mixed crowns" made up of light and darkness. Now it is to be observed, in the first place, that light and darkness are exactly the same thing as the rare and the dense, and it looks as if there was some confusion here. It may be doubted whether these statements are based on anything else than fr. 12, which might certainly be interpreted to mean that between the crowns of fire there were crowns of night with a portion of fire in them. That may be right; but I think it is rather more natural to understand the passage as saying that the narrower circles are surrounded by wider circles of night, each with its portion of fire rushing in the midst of it. These last words would then be a simple repetition of the statement that the narrower circles are filled with unmixed fire,[1] and we should have a

chap. iv. It is unfortunate that the account of Plato's astronomy given in this work is wholly inadequate, owing to the writer's excessive reliance on Boeckh, who was led by evidence now generally regarded as untrustworthy to attribute all the astronomy of the Academy to their predecessors, and especially to Philolaos.

[1] Such a repetition (*παλινδρομία*) is characteristic of all Greek style, but the repetition at the end of the period generally adds a new touch to the statement at the opening. The new touch is here given in the word *ἵεται*. I do not press this interpretation, but it seems to me much the simplest.

fairly exact reproduction of the planetary system of Anaximander. It is, however, possible, though I think less likely, that Parmenides represented the space between the circles as occupied by similar rings in which the fire and darkness were mixed instead of having the fire enclosed in the darkness.

The goddess.

94. "In the middle of those," says Parmenides, "is the goddess who steers the course of all things." Aetios, that is, Theophrastos, explains this to mean in the middle of the mixed crowns, while Simplicius declares that it means in the middle of all the crowns, that is to say, in the centre of the world.[1] It is not very likely that either of them had anything better to go upon than the words of Parmenides just quoted, and these are ambiguous. Simplicius, as is clear from the language he uses, identified this goddess with the Pythagorean Hestia or central fire, while Theophrastos could not do this, because he knew and stated that Parmenides held the earth to be round and in the centre of the world.[2] In this very passage we are told that what is in the middle of all the crowns is solid. The data furnished by Theophrastos, in fact, exclude the identification of the goddess with the central fire altogether. We cannot say that what is in the middle of *all* the crowns is solid, and that under it there is again a fiery crown.[3] Nor does it seem fitting to

[1] Simpl. *Phys.* p. 34, 14 (R. P. 125 b).

[2] Diog. ix. 21 (R. P. 126 a).

[3] I do not discuss the interpretation of *περὶ δ πάλιν πυρώδης* which Diels gave in *Parmenides Lehrgedicht*, p. 104, and which is adopted in R. P. 162 a, as it is now virtually retracted. In the second edition of his *Vorsokratiker* (p. 111) he reads *καὶ τὸ μεσαίτατον πασῶν στερεόν*, <*ὑφ' ᾧ*> *πάλιν πυρώδης* [sc. *στεφάνη*]. That is a flat contradiction. It is of interest to observe that Mr. Adam also gets into the interior of the earth in his interpretation of the Myth of Er. It is instructive, too, because it shows that we are really dealing with the same order of ideas. The most heroic

relegate a goddess to the middle of a solid spherical earth. We must try to find a place for her elsewhere.

We are further told by Aetios that this goddess was called Ananke and the "Holder of Lots."[1] We know already that she steers the course of all things, that is, that she regulates the motions of the celestial crowns. Simplicius adds, unfortunately without quoting the actual words, that she sends souls at one time from the light to the unseen world, at another from the unseen world to the light.[2] It would be difficult to describe more exactly what the goddess does in the Myth of Er, and so here once more we seem to be on Pythagorean ground. It is to be noticed further that in fr. 10 we read how Ananke took the heavens and compelled them to hold fast the fixed courses of the stars, and that in fr. 12 we are told that she is the beginner of all pairing and birth. Lastly, in fr. 13 we hear that she created Eros first of all the gods. Modern parallels are dangerous, but it is not really going much beyond what is written to say that this Eros is the Will to Live, which leads to successive rebirths of the soul. So we shall find that in Empedokles it is an ancient

attempt to save the central fire for Pythagoras was my own hypothesis of an annular earth (1st ed. p. 203). This has met with well-deserved ridicule; but all the same it is the only possible solution on these lines. We shall see in Chap. VII. that the central fire belongs to the later development of Pythagoreanism.

[1] R. P. 126, where Fülleborn's ingenious emendation κληδοῦχον for κληροῦχον is tacitly adopted. This is based upon the view that Aetios (or Theophrastos) was thinking of the goddess that keeps the keys in the Proem (fr. 1, 14). I now think that the κλῆροι of the Myth of Er are the true explanation of the name. Philo uses the term κληροῦχος θεός.

[2] Simpl. *Phys.* p. 39, 19, καὶ τὰς ψυχὰς πέμπειν ποτὲ μὲν ἐκ τοῦ ἐμφανοῦς εἰς τὸ ἀειδές (*i.e.* ἀιδές), ποτὲ δὲ ἀνάπαλίν φησιν. We should probably connect this with the statement of Diog. ix. 22 (R. P. 127) that men arose from the sun (reading ἡλίου with the MSS. for the conjecture ἰλύος in the Basel edition).

oracle or decree of Ananke that causes the gods to fall and become incarnate in a cycle of births.[1]

We should, then, be more certain of the place which this goddess occupies in the universe if we could be quite sure where Ananke is in the Myth of Er. Without, however, raising that vexed question, we may lay down with some confidence that, according to Theophrastos, she occupied a position midway between the earth and the heavens. Whether we believe in the "mixed crowns" or not makes no difference in this respect; for the statement of Aetios that she was in the middle of the mixed crowns undoubtedly implies that she was in that region. Now she is identified with one of the crowns in a somewhat confused passage of Cicero,[2] and we have seen above (p. 69) that the whole theory of wheels or crowns was probably suggested by the Milky Way. It seems to me, therefore, that we must think of the Milky Way as a crown intermediate between the crowns of the Sun and the Moon, and this agrees very well with the prominent way in which it is mentioned in fr. 11. It is better not to be too positive about the other details of the system, though it is interesting to notice that according to some it was Pythagoras, and according to others Parmenides, who discovered the identity of the evening and morning star. That fits in exactly with our general view.[3]

[1] Empedokles, fr. 115.

[2] Cicero, *de nat. D.* i. 11, 28: "Nam Parmenides quidem commenticium quiddam coronae simile efficit (*στεφάνην* appellat), continente ardore lucis orbem, qui cingat caelum, quem appellat deum." We may connect with this the statement of Aetios, ii. 20, 8, *τὸν ἥλιον καὶ τὴν σελήνην ἐκ τοῦ γαλαξίου κύκλου ἀποκριθῆναι.*

[3] Diog. ix. 23, *καὶ δοκεῖ* (Παρμενίδης) *πρῶτος πεφωρακέναι τὸν αὐτὸν εἶναι Ἕσπερον καὶ Φωσφόρον, ὥς φησι Φαβωρῖνος ἐν πέμπτῳ Ἀπομνημονευμάτων· οἱ δὲ Πυθαγόραν.* If, as Achilles says, the poet Ibykos of Rhegion had anticipated Parmenides in announcing this discovery, that is to be

Besides all this, it is quite certain that Parmenides went on to describe how the other gods were born and how they fell, an idea which we know to be Orphic, and which may well have been Pythagorean. We shall come to it again in Empedokles. In Plato's *Symposium*, Agathon couples Parmenides with Hesiod as a narrator of ancient deeds of violence committed by the gods.[1] If Parmenides was expounding the Pythagorean theology, all this is just what we should expect; but it seems hopeless to explain it on any of the other theories which have been advanced on the purpose of the Way of Belief. Such things do not follow naturally from the ordinary view of the world, and we have no reason to suppose that Herakleitos expounded his views of the upward and downward path of the soul in this form. He certainly did hold that the guardian spirits entered into human bodies; but the whole point of his theory was that he gave a naturalistic rather than a theological account of the process. Still less can we think it probable that Parmenides made up these stories himself in order to show what the popular view of the world really implied if properly formulated. We must ask, I think, that any theory on the subject shall account for what was evidently no inconsiderable portion of the poem.

95. In describing the views of his contemporaries, Parmenides was obliged, as we see from the fragments, Physiology.

explained by the fact that Rhegion had become the chief seat of the Pythagorean school.

[1] Plato, *Symp.* 195 c 1. It is implied that these παλαιὰ πράγματα were πολλὰ καὶ βίαια, including such things as ἐκτομαί and δεσμοί. The Epicurean criticism of all this is partially preserved in Philodemos, *de pietate*, p. 68, Gomperz; and Cicero, *de nat. D.* i. 28 (*Dox.* p. 534; R. P. 126 b).

to say a good deal about physiological matters. Like everything else, man was composed of the warm and the cold, and death was caused by the removal of the warm. Some curious views with regard to generation were also stated. In the first place, males came from the right side and females from the left. Women had more of the warm and men of the cold, a view which we shall find Empedokles contradicting.[1] It is just the proportion of the warm and cold in men that determines the character of their thought, so that even corpses, from which the warm has been removed, retain a perception of what is cold and dark.[2] These fragments of information do not tell us much when taken by themselves; but they connect themselves in a most interesting way with the history of medicine, and point to the fact that one of its leading schools stood in close relation with the Pythagorean Society Even before the days of Pythagoras, we know that Kroton was famous for its doctors. A Krotoniate, Demokedes, was court physician to the Persian king, and married Milo the Pythagorean's daughter.[3] We also know the name of a very distinguished medical writer who lived at Kroton in the days between Pythagoras and Parmenides, and the few facts we are told about him enable us to regard the physiological views described by Parmenides not as isolated curiosities, but as landmarks by means of which we can trace the origin and growth of one of the most influential of medical theories, that which explains health as a balance of opposites.

[1] For all this, see R. P. 127 a, with Arist. *de Part. An.* B, 2. 648 a 28; *de Gen. An.* Δ, 1. 765 b 19.

[2] Theophr. *de sens.* 3, 4 (R. P. 129).

[3] Herod. iii. 131, 137.

Alkmaion of Kroton.

96. Aristotle tells us that Alkmaion of Kroton[1] was a young man in the old age of Pythagoras. He does not actually say, as later writers do, that he was a Pythagorean, though he points out that he seems either to have derived his theory of opposites from the Pythagoreans or they theirs from him.[2] In any case, he was intimately connected with the society, as is proved by one of the scanty fragments of his book. It began as follows: "Alkmaion of Kroton, son of Peirithous, spoke these words to Brotinos and Leon and Bathyllos. As to things invisible and things mortal, the gods have certainty; but, so far as men may infer . . ."[3] The quotation unfortunately ends in this abrupt way, but we learn two things from it. In the first place, Alkmaion possessed that reserve which marks all the best Greek medical writers; and in the second place, he dedicated his work to the heads of the Pythagorean Society.[4]

Alkmaion's chief importance in the history of philosophy really lies in the fact that he is the founder of empirical psychology.[5] It is certain that he regarded

[1] On Alkmaion, see especially Wachtler, *De Alcmaeone Crotoniata* (Leipzig, 1896).

[2] Arist. *Met.* A, 5. 986 a 27 (R. P. 66). In a 30 Diels reads, with great probability, ἐγένετο τὴν ἡλικίαν <νέος> ἐπὶ γέροντι Πυθαγόρᾳ. Cf. Iambl. *V. Pyth.* 104, where Alkmaion is mentioned among the συγχρονίσαντες καὶ μαθητεύσαντες τῷ Πυθαγόρᾳ πρεσβύτῃ νέοι.

[3] Ἀλκμαίων Κρωτωνιήτης τάδε ἔλεξε Πειρίθου υἱὸς Βροτίνῳ καὶ Λέοντι καὶ Βαθύλλῳ· περὶ τῶν ἀφανέων, περὶ τῶν θνητῶν, σαφήνειαν μὲν θεοὶ ἔχοντι, ὡς δὲ ἀνθρώποις τεκμαίρεσθαι καὶ τὰ ἑξῆς. The fact that this is not written in conventional Doric, like the forged Pythagorean books, is a strong proof of genuineness.

[4] Brotinos (not Brontinos) is variously described as the son-in-law or father-in-law of Pythagoras. Leon is one of the Metapontines in the catalogue of Iamblichos (Diels, *Vors.* p. 268), and Bathyllos is presumably the Poseidoniate Bathylaos also mentioned there.

[5] Everything bearing on the early history of this subject is brought together and discussed in Prof. Beare's *Greek Theories of Elementary Cognition*, to which I must refer the reader for all details.

the brain as the common sensorium, an important discovery which Hippokrates and Plato adopted from him, though Empedokles, Aristotle, and the Stoics reverted to the more primitive view that the heart performs this function. There is no reason to doubt that he made this discovery by anatomical means. We have some authority for saying that he practised dissection, and, though the nerves were not yet recognised as such, it was known that there were certain "passages" which might be prevented from communicating sensations to the brain by lesions.[1] He also distinguished between sensation and understanding, though we have no means of knowing exactly where he drew the line between them. His theories of the special senses are of great interest. We find in him already, what is characteristic of Greek theories of vision as a whole, the attempt to combine the view of vision as an act proceeding from the eye with that which attributes it to an image reflected in the eye. He knew the importance of air for the sense of hearing, though he called it the void, a thoroughly Pythagorean touch. With regard to the other senses, our information is more scanty, but sufficient to show that he treated the subject systematically.[2]

His astronomy seems surprisingly crude for one who stood in close relations with the Pythagoreans. We are told that he adopted Anaximenes' theory of the sun and Herakleitos's explanation of eclipses.[3]

[1] Theophr. *de sens.* 26 (Beare, p. 252, n. 1). Our authority for the dissections of Alkmaion is only Chalcidius, but he gets his information on such matters from far older sources. The *πόροι* and the inference from lesions are vouched for by Theophrastos.

[2] The details will be found in Beare, pp. 11 sqq. (vision), pp. 93 sqq. (hearing), pp. 131 sqq. (smell), pp. 180 sqq. (touch), pp. 160 sqq. (taste).

[3] Aet. ii. 22, 4, *πλατὺν εἶναι τὸν ἥλιον*; 29, 3, *κατὰ τὴν τοῦ σκαφοειδοῦς στροφὴν καὶ τὰς περικλίσεις* (*ἐκλείπειν τὴν σελήνην*).

It is all the more remarkable that he is credited with originating the idea, which it required all Plato's authority to get accepted later, that the planets have an orbital motion in the opposite direction to the diurnal revolution of the heavens.[1] This, if true, probably stood in close connexion with his saying that soul was immortal because it resembled immortal things, and was always in motion like the heavenly bodies.[2] He seems, in fact, to be the real author of the curious view which Plato put into the mouth of the Pythagorean Timaios, that the soul has circles revolving just as the heavens and the planets do. This too seems to be the explanation of his further statement that man dies because he cannot join the beginning to the end.[3] The orbits of the heavenly bodies always come full circle, but the circles in the head may fail to complete themselves. This new version of the parallelism between the microcosm and the macrocosm would be perfectly natural for Alkmaion, though it is, of course, no more than a playful fancy to Plato.

Alkmaion's theory of health as "isonomy" is at once that which most clearly connects him with earlier inquirers like Anaximander, and also that which had the greatest influence on the subsequent development of philosophy. He observed, to begin with, that "most things human were two," and by this he meant that man was made up of the hot and the cold, the moist and

[1] Aet. ii. 16, 2, (*τῶν μαθηματικῶν τινες*) *τοὺς πλανήτας τοῖς ἀπλάνεσιν ἀπὸ δυσμῶν ἐπ' ἀνατολὰς ἀντιφέρεσθαι. τούτῳ δὲ συνομολογεῖ καὶ Ἀλκμαίων.*

[2] Arist. *de An.* A, 2. 405 a 30 (R. P. 66 c).

[3] Arist. *Probl.* 17, 3. 916 a 33, *τοὺς ἀνθρώπους φησὶν Ἀλκμαίων διὰ τοῦτο ἀπόλλυσθαι, ὅτι οὐ δύνανται τὴν ἀρχὴν τῷ τέλει προσάψαι.*

the dry, and the rest of the opposites.[1] Disease was just the "monarchy" of any one of these—the same thing that Anaximander had called "injustice"—while health was the establishment in the body of a free government with equal laws.[2] This was the leading doctrine of the Sicilian school of medicine which came into existence not long after, and we shall have to consider in the sequel its influence on the development of Pythagoreanism. Taken along with the theory of "pores,"[3] it is of the greatest importance for later science.

[1] Arist. *Met.* A, 5. 986 a 27 (R. P. 66).

[2] Aet. v. 30, 1, *'Αλκμαίων τῆς μὲν ὑγιείας εἶναι συνεκτικὴν τὴν ἰσονομίαν τῶν δυνάμεων, ὑγροῦ, ξηροῦ, ψυχροῦ, θερμοῦ, πικροῦ, γλυκέος, καὶ τῶν λοιπῶν, τὴν δ' ἐν αὐτοῖς μοναρχίαν νόσου ποιητικήν· φθοροποιὸν γὰρ ἑκατέρου μοναρχίαν.*

[3] My colleague, Dr. Fraser Harris, points out to me that Alkmaion's *πόροι* may have been a better guess than he knew. The nerve-fibres, when magnified 1000 diameters, "sometimes appear to have a clear centre, as if the fibrils were tubular."—Schäfer, *Essentials of Physiology* (7th edition), p. 132.

CHAPTER V

EMPEDOKLES OF AKRAGAS

97. THE belief that all things are one was common to the philosophers we have hitherto studied; but now Parmenides has shown that, if this one thing really *is*, we must give up the idea that it can take different forms. The senses, which present to us a world of change and multiplicity, are deceitful. From this there was no escape; the time was still to come when men would seek the unity of the world in something which, from its very nature, the senses could never perceive. Pluralism.

We find, accordingly, that from the time of Parmenides to that of Plato, all thinkers in whose hands philosophy made real progress abandoned the monistic hypothesis. Those who still held by it adopted a critical attitude, and confined themselves to a defence of the theory of Parmenides against the new views. Others taught the doctrine of Herakleitos in an exaggerated form; some continued to expound the systems of the early Milesians. This, of course, showed want of insight; but even those thinkers who saw that Parmenides could not be left unanswered, were by no means equal to their predecessors in power and thoroughness. The corporealist hypothesis had

proved itself unable to bear the weight of a monistic structure; but a thorough-going pluralism such as the atomic theory might have some value, if not as a final explanation of the world, yet at least as an intelligible view of a part of it. Any pluralism, on the other hand, which, like that of Empedokles and Anaxagoras, stops short of the atoms, will achieve no permanent result, however many may be the brilliant *aperçus* which it embodies. It will remain an attempt to reconcile two things that cannot be reconciled, and may always, therefore, be developed into contradictions and paradoxes.

Date of Empedokles.

98. Empedokles was a citizen of Akragas in Sicily, and his father's name, according to the best accounts, was Meton.[1] His grandfather, also called Empedokles, had won a victory in the horse-race at Olympia in Ol. LXXI. (496-95 B.C.),[2] and Apollodoros fixed the *floruit* of Empedokles himself in Ol. LXXXIV. 1 (444-43 B.C.). This is the date of the foundation of Thourioi; and it appears from the quotation in Diogenes that the almost contemporary biographer, Glaukos of Rhegion,[3] said Empedokles visited the

[1] Aet. i. 3, 20 (R. P. 164), Apollodoros *ap.* Diog. viii. 52 (R. P. 162). The details of the life of Empedokles are discussed, with a careful criticism of the sources, by Bidez, *La biographie d'Empédocle* (Gand, 1894).

[2] For this we have the authority of Apollodoros (Diog. viii. 51, 52; R. P. 162), who follows the *Olympic Victors* of Eratosthenes, who in turn appealed to Aristotle. Herakleides of Pontos, in his Περὶ νόσων (see below, p. 233, n. 3), spoke of the elder Empedokles as a "breeder of horses" (R. P. 162 a); and Timaios mentioned him as a distinguished man in his Fifteenth Book.

[3] Glaukos wrote Περὶ τῶν ἀρχαίων ποιητῶν καὶ μουσικῶν, and is said to have been contemporary with Demokritos (Diog. ix. 38). Apollodoros adds (R. P. 162) that, according to Aristotle and Herakleides, Empedokles died at the age of sixty. It is to be observed, however, that the words ἔτι δ' Ἡρακλείδης are Sturz's conjecture, the MSS. having ἔτι δ' Ἡράκλειτον, and Diogenes certainly said (ix. 3) that Herakleitos lived sixty years. On the other hand, if the statement of Aristotle comes from the Περὶ ποιητῶν, it is

new city shortly after its foundation. But we are in no way bound to believe that he was just forty years old at the time of the event in his life which can most easily be dated. That is the assumption made by Apollodoros; but there are reasons for thinking that his date is too late by some eight or ten years.[1] It is, indeed, most likely that Empedokles did not go to Thourioi till after his banishment from Akragas, and he may well have been more than forty years old when that happened. All, therefore, we can be said to know of his date is, that his grandfather was still alive in 496 B.C.; that he himself was active at Akragas after 472, the date of Theron's death; and that he died later than 444.

Even these indications are enough to show that he must have been a boy in the reign of Theron, the tyrant who co-operated with Gelon of Syracuse in the repulse of the Carthaginians from Himera. His son and successor, Thrasydaios, was a man of another stamp. Before his accession to the throne of Akragas, he had ruled in his father's name at Himera, and completely estranged the affections of its inhabitants. Theron died in 472 B.C., and Thrasydaios at once displayed all the vices and follies usual in the second holder of a usurped dominion. After a disastrous war with Hieron of Syracuse, he was driven out; and Akragas enjoyed a free government till it

not obvious why he should mention Herakleitos at all; and Herakleides was one of the chief sources for the biography of Empedokles.

[1] See Diels, "Empedokles und Gorgias," 2 (*Berl. Sitzb.*, 1884). Theophrastos said that Empedokles was born "not long after Anaxagoras" (*Dox.* p. 477, 17); and Alkidamas made him the fellow-pupil of Zeno under Parmenides, and the teacher of Gorgias (see below, p. 231, n. 5). Now Gorgias was a little older than Antiphon (*b.* Ol. LXX.), so it is clear we must go back *at least* to 490 B.C. for the birth of Empedokles.

fell before the Carthaginians more than half a century later.[1]

Empedokles as a politician.

99. In the political events of the next few years, Empedokles certainly played an important part; but our information on the subject is of a very curious kind. The Sicilian historian Timaios told one or two stories about him, which are obviously genuine traditions picked up about a hundred and fifty years afterwards; but, like all popular traditions, they are a little confused. The picturesque incidents are remembered, but the essential parts of the story are dropped. Still, we may be thankful that the "collector of old wives' tales,"[2] as sneering critics called him, has enabled us to measure the historical importance of Empedokles for ourselves by showing us how he was pictured by the great-grandchildren of his contemporaries.

We read, then,[3] that once he was invited to sup with one of the "rulers." Tradition delights in such vague titles. "Supper was well advanced, but no wine was brought in. The rest of the company said nothing, but Empedokles was righteously indignant, and insisted on wine being served. The host, however, said he was waiting for the serjeant of the Council. When that official arrived, he was appointed ruler of the feast. The host, of course, appointed him. Thereupon he began to give hints of an incipient tyranny. He ordered the company either to drink or have the wine poured over their heads. At the time, Empedokles said nothing; but next day he led both

[1] E. Meyer, *Gesch. des Alterth.* ii. p. 508.

[2] He is called γραοσυλλέκτρια in Souidas, *s.v.* The view taken in the text as to the value of his evidence is that of Holm.

[3] Timaios *ap.* Diog. viii. 64 (*F.H.G.* i. p. 214, fr. 88 a).

of them before the court, and had them condemned and put to death—both the man who asked him to supper and the ruler of the feast.[1] This was the beginning of his political career." The next tale is that Empedokles prevented the Council from granting his friend Akron a piece of land for a family sepulchre on the ground of his eminence in medicine, and supported his objection by a punning epigram.[2] Lastly, he broke up the assembly of the Thousand—perhaps some oligarchical association or club.[3] It may have been for this that he was offered the kingship, which Aristotle tells us he refused.[4] At any rate, we see that Empedokles was the great democratic leader at Akragas in those days, though we have no clear knowledge of what he did.

Empedokles as a religious teacher.

100. But there is another side to his public character which Timaios found it hard to reconcile with his political views. He claimed to be a god, and to receive the homage of his fellow-citizens in that capacity. The truth is, Empedokles was not a mere statesman; he had a good deal of the "medicine-man" about him. According to Satyros,[5] Gorgias affirmed that he had

[1] In the first edition, I suggested the analogy of accusations for *incivisme*. Bidez says (p. 127), "J'imagine qu'un Jacobin aurait mieux jugé l'histoire" (than Karsten and Holm); "sous la Terreur, on était suspect pour de moindres vétilles."

[2] Diog. viii. 65. The epigram runs thus:

> ἄκρον ἰητρὸν Ἄκρων' Ἀκραγαντῖνον πατρὸς Ἄκρου
> κρύπτει κρημνὸς ἄκρος πατρίδος ἀκροτάτης.

On Akron, see M. Wellmann, *op. cit.* p. 235, n. 1.

[3] Diog. viii. 66, *ὕστερον δ' ὁ Ἐμπεδοκλῆς καὶ τὸ τῶν χιλίων ἄθροισμα κατέλυσε συνεστὼς ἐπὶ ἔτη τρία.* The word *ἄθροισμα* hardly suggests a legal council, and *συνίστασθαι* suggests a conspiracy.

[4] Diog. viii. 63. Aristotle probably mentioned this in his *Sophist*. Cf. Diog. viii. 57.

[5] Diog. viii. 59 (R. P. 162). Satyros probably followed Alkidamas. Diels suggests (*Emp. u. Gorg.* p. 358) that the *φυσικός* of Alkidamas was

been present when his master was performing sorceries. We can see what this means from the fragments of the *Purifications*. Empedokles was a preacher of the new religion which sought to secure release from the "wheel of birth" by purity and abstinence; but it is not quite certain to which form of it he adhered. On the one hand, Orphicism seems to have been strong at Akragas in the days of Theron, and there are even some verbal coincidences between the poems of Empedokles and the Orphicising Odes which Pindar addressed to that prince.[1] There are also some points of similarity between the *Rhapsodic Theogony*, as we know it from Damaskios, and certain fragments of Empedokles, though the importance of these has been exaggerated.[2] On the other hand, there is no reason to doubt the statement of Ammonios that fr. 134 refers to Apollo;[3] and, if that is so, it would point to his having been an adherent of the Ionic form of the mystic doctrine, as we have seen (§ 39) that Pythagoras was. Further, Timaios already knew the story that he had been expelled from the Pythagorean Order for "stealing discourses,"[4] and it is probable on the whole that fr. 129 refers to Pythagoras.[5] It would be very hazardous to dogmatise on this subject; but it seems most likely that Empedokles had been influenced by Orphic ideas in his youth, and that, in later life, he preached a form of Pythagoreanism which

a dialogue in which Gorgias was the chief speaker. In that case, the statement would have little historical value.

[1] See Bidez, p. 115, n. 1.

[2] O. Kern, "Empedokles und die Orphiker" (*Arch.* i. pp. 489 sqq.). For the *Rhapsodic Theogony*, see Introd. p. 9, n. 4.

[3] See below, note *in loc.*

[4] Diog. viii. 54 (R. P. 162).

[5] See below, note *in loc.*

was not considered orthodox by the heads of the Society. In any case, it seems far more probable that his political and scientific activity belong to the same period of his life, and that he only became a wandering prophet after his banishment, than that his scientific work belonged to his later days when he was a solitary exile.[1]

We hear of a number of marvels performed by Empedokles, which are for the most part nothing but inferences from his writings. Timaios told how he weakened the force of the etesian winds by hanging bags of asses' skins on the trees to catch them. He had certainly said, in his exaggerated way, that the knowledge of science as taught by him would enable his disciples to control the winds (fr. 111); and this, along with the fabled windbags of Aiolos, is enough to account for the tale.[2] We are also told how he brought back to life a woman who had been breathless and pulseless for thirty days. The verse where he asserts that his teaching will enable Pausanias to bring the dead back from Hades (fr. 111) shows how this story may have arisen.[3] Again, we hear that he sweetened the pestilent marsh between Selinous and the sea by diverting the rivers Hypsas and Selinos into it. We know from coins that this purification

[1] The latter view is that of Bidez (pp. 161 sqq.); but Diels has shown (*Berl. Sitzb.*, 1898, pp. 406 sqq.) that the former is psychologically more probable.

[2] I follow the wilder form of the story given by Diog. viii. 60, and not the rationalised version of Plutarch (*adv. Col.* 1126 b). The epithets *ἀλεξανέμας* and *κωλυσανέμας* were perhaps bestowed by some sillographer in mockery; cf. *ἀνεμοκοίτης*.

[3] The *Περὶ νόσων* of Herakleides, from which it is derived, seems to have been a sort of medico-philosophical romance. The words are (Diog. viii. 60): *Ἡρακλείδης τε !ἐν ' τῷ· Περὶ νόσων |φησὶ καὶ] Παυσανίᾳ ὑφηγήσασθαι αὐτὸν τὰ περὶ τὴν ἄπνουν.* It was a case of hysterical suffocation.

of the marshes actually took place, but we may doubt whether it was attributed to Empedokles till a later time.[1]

Rhetoric and medicine.

101. Aristotle said that Empedokles was the inventor of Rhetoric;[2] and Galen made him the founder of the Italian school of Medicine, which he puts on a level with those of Kos and Knidos.[3] Both these statements must be considered in connexion with his political and scientific activity. It seems to be certain that Gorgias was his disciple in physics and medicine, and some of the peculiarities which marked his style are to be found in the poems of Empedokles.[4] It is not to be supposed, of course, that Empedokles wrote a formal treatise on Rhetoric; but it is in every way probable, and in accordance with his character, that the speeches, of which he must have made many, were marked by that euphuism which Gorgias introduced to Athens at a later date, and which gave rise to the idea of an artistic prose. The influence of Empedokles on the development of medicine was, however, far more important, as it affected not only medicine itself, but through it, the whole tendency of scientific and philosophical thinking. It has been said that Empedokles had no successors,[5] and the remark is

[1] For these coins see Head, *Historia Numorum*, pp. 147 sqq.

[2] Diog. viii. 57 (R. P. 162 g).

[3] Galen, x. 5, *ἤριζον δ' αὐτοῖς* (the schools of Kos and Knidos) . . . *καὶ οἱ ἐκ τῆς Ἰταλίας ἰατροί, Φιλιστίων τε καὶ Ἐμπεδοκλῆς καὶ Παυσανίας καὶ οἱ τούτων ἑταῖροι κ.τ.λ.* Philistion was the contemporary and friend of Plato; Pausanias is the disciple to whom Empedokles addressed his poem.

[4] See Diels, "Empedokles und Gorgias" (*Berl. Sitzb.*, 1884, pp. 343 sqq.). The oldest authority for saying that Gorgias was a disciple of Empedokles is Satyros *ap.* Diog. viii. 58 (R. P. 162); but he seems to have derived his information from Alkidamas, who was the disciple of Gorgias himself. In Plato's *Meno* (76 c 4-8) the Empedoklean theory of effluvia and pores is ascribed to Gorgias.

[5] Diels (*Berl. Sitzb.*, 1884, p. 343).

true if we confine ourselves strictly to philosophy. On the other hand, the medical school which he founded was still living in the days of Plato, and it had considerable influence on him, and still more on Aristotle.[1] Its fundamental doctrine was the identification of the four elements with the hot and the cold, the moist and the dry. It also held that we breathe through all the pores of the body, and that the act of respiration is closely connected with the motion of the blood. The heart, not the brain, was regarded as the organ of consciousness.[2] A more external characteristic of the medicine taught by the followers of Empedokles is that they still clung to ideas of a magical nature. A protest against this by a member of the Koan school has been preserved. He refers to them as "magicians and purifiers and charlatans and quacks, who profess to be very religious."[3] Though there is some truth in this, it hardly does justice to the great advances in physiology that were due to the Sicilian school.

Relation to predecessors.

102. In the biography of Empedokles, we hear very little of his theory of nature. The only hints we get are some statements about his teachers. Alkidamas, who had good opportunities of knowing, made him a

[1] See M. Wellmann, *Fragmentsammlung der griechischen Ärtzte*, vol. i. (Berlin, 1901). According to Wellmann, both Plato (in the *Timaeus*) and Diokles of Karystos depend upon Philistion. It is impossible to understand the history of philosophy from this point onwards without keeping the history of medicine constantly in view.

[2] For the four elements, cf. Anon. Lond. xx. 25 (Menon's *Iatrika*), *Φιλιστίων δ' οἴεται ἐκ δ' ἰδεῶν συνεστάναι ἡμᾶς, τοῦτ' ἔστιν ἐκ δ' στοιχείων· πυρός, ἀέρος, ὕδατος, γῆς. εἶναι δὲ καὶ ἑκάστου δυνάμεις, τοῦ μὲν πυρὸς τὸ θερμόν, τοῦ δὲ ἀέρος τὸ ψυχρόν, τοῦ δὲ ὕδατος τὸ ὑγρόν, τῆς δὲ γῆς τὸ ξηρόν.* For the theory of respiration, see Wellmann, pp. 82 sqq.; and for the heart as the seat of consciousness, *ib.* pp. 15 sqq.

[3] Hippokr. *Περὶ ἱερῆς νόσου*, c 1, *μάγοι τε καὶ καθάρται καὶ ἀγύρται καὶ ἀλαζόνες.* The whole passage should be read. Cf. Wellmann, p. 29 n.

fellow-student of Zeno under Parmenides. That is both possible and likely. Theophrastos too made him a follower and imitator of Parmenides. But the further statement that he had "heard" Pythagoras cannot be right. Probably Alkidamas said "Pythagoreans."[1]

Some writers hold that certain parts of the system of Empedokles, in particular the theory of pores and effluvia (§ 118), which do not seem to follow very naturally from his own principles, were due to the influence of Leukippos.[2] This, however, is not necessarily the case. We know that Alkmaion (§ 96) spoke of "pores" in connexion with sensation, and it may equally well be from him that Empedokles got the theory. It may be added that this is more in accordance with the history of certain other physiological views which are common to Alkmaion and the later Ionian philosophers. We can generally see that those reached Ionia through the medical school which Empedokles founded.[3]

Death. 103. We are told that Empedokles leapt into the crater of Etna that he might be deemed a god. This appears to be a malicious version[4] of a tale set on foot by his adherents that he had been snatched up to heaven in the night.[5] Both stories would easily get

[1] Diog. viii. 54-56 (R. P. 162).

[2] Diels, *Verhandl. d.* 35 *Philologenversamml.* pp. 104 sqq., Zeller, p. 767. It would be fatal to the main thesis of the next few chapters if it could be proved that Empedokles was influenced by Leukippos. I hope to show that Leukippos was influenced by the later Pythagorean doctrine (Chap. IX. § 171), which was in turn affected by Empedokles (Chap. VII. § 147).

[3] For πόροι in Alkmaion, cf. Arist. *de Gen. An.* B, 6. 744 a 8; Theophr. *de sens.* 26; and for the way in which his embryological and other views were transmitted through Empedokles to the Ionian physicists, cf. Fredrich, *Hippokratische Untersuchungen*, pp. 126 sqq.

[4] R. P. 162 h. The story is always told with a hostile purpose.

[5] R. P. *ib.* This was the story told by Herakleides of Pontos, at the end of his romance about the ἄπνους.

accepted; for there was no local tradition. Empedokles did not die in Sicily, but in the Peloponnese, or, perhaps, at Thourioi. He had gone to Olympia to have his religious poem recited to the Hellenes; his enemies were able to prevent his return, and he was seen in Sicily no more.[1]

104. Empedokles was the second philosopher to expound his system in verse, if we leave the satirist Xenophanes out of account. He was also the last among the Greeks; for the forged Pythagorean poems may be neglected.[2] Lucretius imitates Empedokles in this, just as Empedokles imitated Parmenides. Of course, the poetical imagery creates a difficulty for the interpreter; but it would be wrong to make too much of it. It cannot be said that it is harder to extract the philosophical kernel from the verses of Empedokles than from the prose of Herakleitos. Writings.

There is some divergence of opinion as to the poetical merit of Empedokles. The panegyric of Lucretius is well known.[3] Aristotle says in one place that Empedokles and Homer have nothing in common but the metre; in another, that Empedokles was "most Homeric."[4] To my mind, there can be no question that he was a genuine poet, far more so than Parmenides. No one doubts nowadays that Lucretius was one, and Empedokles really resembles him very closely.

[1] Timaios took the trouble to refute the common stories at some length (Diog. viii. 71 sqq.; R. P. *ib.*). He was quite positive that Empedokles never returned to Sicily. Nothing can be more likely than that, when wandering as an exile in the Peloponnese, he should have seized the opportunity of joining the colony at Thourioi, which was a harbour for many of the "sophists" of this time.

[2] See Chap. IV. § 85.

[3] Lucr. i. 716 sqq.

[4] *Poet.* 1. 1447 b 18; cf. Diog. viii. 57 (R. P. 162.i).

The remains. 105. We have more abundant remains of Empedokles than of any other early Greek philosopher. If we may trust our manuscripts of Diogenes and of Souidas, the librarians of Alexandria estimated the *Poem on Nature* and the *Purifications* together as 5000 verses, of which about 2000 belonged to the former work.[1] Diels gives about 350 verses and parts of verses from the cosmological poem, or not a fifth of the whole. It is important to remember that, even in this favourable instance, so much has been lost. Besides the two poems, the Alexandrian scholars possessed a prose work of 600 lines on medicine ascribed to Empedokles. The tragedies and other poems which were sometimes attributed to him seem really to belong to a younger writer of the same name, who is said by Souidas to have been his grandson.[2]

I give the remains as they are arranged by Diels:—

(1)

And do thou give ear, Pausanias, son of Anchitos the wise!

(2)

For straitened are the powers that are spread over their bodily parts, and many are the woes that burst in on them and

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[1] Diog. viii. 77 (R. P. 162); Souidas *s.v.* Ἐμπεδοκλῆς· καὶ ἔγραψε δι' ἐπῶν Περὶ φύσεως τῶν ὄντων βιβλία β', καὶ ἔστιν ἔπη ὡς δισχίλια. It hardly seems likely, however, that the Καθαρμοί extended to 3000 verses, so Diels proposes to read πάντα τρισχίλια for πεντακισχίλια in Diogenes. It is to be observed that there is no better authority than Tzetzes for dividing the Περὶ φύσεως into three books. See Diels, "Über die Gedichte des Empedokles" (*Berl. Sitzb.*, 1898, pp. 396 sqq.).

[2] Hieronymos of Rhodes declared (Diog. viii. 58) that he had met with forty-three of these tragedies; but see Stein, pp. 5 sqq. The poem on the Persian Wars, which Hieronymos also refers to (Diog. viii. 57), seems to have arisen from an old corruption in the text of Arist. *Probl.* 929 b 16, where Bekker still reads ἐν τοῖς Περσικοῖς. The same passage, however, is said to occur ἐν τοῖς φυσικοῖς, in *Meteor.* Δ, 4. 382 a 1, though there too E reads Περσικοῖς.

blunt the edge of their careful thoughts! They behold but a brief span of a life that is no life,[1] and, doomed to swift death, are borne up and fly off like smoke. Each is convinced of that alone which he had chanced upon as he is hurried to and fro, and idly boasts he has found the whole. So hardly can these things be seen by the eyes or heard by the ears of men, so hardly grasped by their mind! Thou,[2] then, since thou hast found thy way hither, shalt learn no more than mortal mind hath power. R. P. 163.

(3)

. . . to keep within thy dumb heart.

(4)

But, O ye gods, turn aside from my tongue the madness of those men.[3] Hallow my lips and make a pure stream flow from them! And thee, much-wooed, white-armed Virgin Muse, do I beseech that I may hear what is lawful for the children of a day! Speed me on my way from the abode of Holiness and drive my willing car! Thee shall no garlands of glory and honour at the hands of mortals constrain to lift them from the ground, on condition of speaking in thy pride beyond that which is lawful and right, and so to gain a seat upon the heights of wisdom.

Go to now, consider with all thy powers in what way each thing is clear. Hold not thy sight in greater credit as compared with thy hearing, nor value thy resounding ear above the clear instructions of thy tongue;[4] and do not withhold thy confidence in any of thy other bodily parts by which there is an opening for understanding,[5] but consider everything in the way it is clear. R. P. 163.

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[1] The MSS. of Sextus have *ζωῆσι βίου*. Diels reads *ζωῆς ἰδίου*. I still prefer Scaliger's *ζωῆς ἀβίου*. Cf. fr. 15, *τὸ δὴ βίοτον καλέουσι*.

[2] The person here addressed is still Pausanias, and the speaker Empedokles. Cf. fr. 111.

[3] No doubt mainly Parmenides.

[4] The sense of taste, not speech.

[5] Zeller in his earlier editions retained the full stop after *νοῆσαι*, thus getting almost the opposite sense: "Withhold all confidence in thy bodily senses"; but he admits in his fifth edition (p. 804, n. 2) that the context is in favour of Stein, who put only a comma at *νοῆσαι* and took *ἄλλων* closely

(5)

But it is ever the way of low minds to disbelieve their betters. Do thou learn as the sure testimonies of my Muse bid thee, dividing the argument in thy heart.[1]

(6)

Hear first the four roots of all things: shining Zeus, life-bringing Hera, Aidoneus, and Nestis whose tear-drops are a well-spring to mortals. R. P. 164.[2]

(7)

. . . uncreated.

(8)

And I shall tell thee another thing. There is no coming into being of aught that perishes, nor any end for it in baneful death; but only mingling and change of what has been mingled. Coming into being is but a name given to these by men. R. P. 165.

(9)

But, when the elements have been mingled in the fashion of a man and come to the light of day, or in the fashion of the race of wild beasts or plants or birds, then men say that these come into being; and when they are separated, they call that woeful death. They call it not aright; but I too follow the custom, and call it so myself.

(10)

Avenging death.

(11, 12)

Fools!—for they have no far-reaching thoughts—who deem that what before was not comes into being, or that

with γυίων. So too Diels. The paraphrase given by Sextus (R. P. *ib.*) is substantially right.

[1] There is no difficulty in the MS. διατμηθέντος if we take λόγοιο as "discourse," "argument" (cf. διαιρεῖν). Diels conjectures διασσηθέντος, rendering "when their words have passed through the sieve of thy mind." Nor does it seem to me necessary to read χαρτά for κάρτα in the first line.

[2] The four elements are introduced under mythological names, for which see below, p. 264, n. 1. Diels is clearly right in removing the comma after τέγγει, and rendering *Nestis quae lacrimis suis laticem fundit mortalibus destinatum.*

aught can perish and be utterly destroyed. For it cannot be that aught can arise from what in no way is, and it is impossible and unheard of that what *is* should perish; for it will always *be*, wherever one may keep putting it. R. P. 165 a.

(13)

And in the All there is naught empty and naught too full.

(14)

In the All there is naught empty. Whence, then, could aught come to increase it?

(15)

A man who is wise in such matters would never surmise in his heart that as long as mortals live what they call their life, so long they are, and suffer good and ill; while before they were formed and after they have been dissolved they are just nothing at all. R. P. 165 a.

(16)

For of a truth they (Strife and Love) were aforetime and shall be; nor ever, methinks, will boundless time be emptied of that pair. R. P. 166 c.

(17)

I shall tell thee a twofold tale. At one time it grew to be one only out of many; at another, it divided up to be many instead of one. There is a double becoming of perishable things and a double passing away. The coming together of all things brings one generation into being and destroys it; the other grows up and is scattered as things become divided. And these things never cease continually changing places, at one time all uniting in one through Love, at another each borne in different directions by the repulsion of Strife. Thus, as far as it is their nature to grow into one out of many, and to become many once more when the one is parted asunder, so far they come into being and their life abides not. But, inasmuch as they never cease changing their places continually, so far they are ever immovable as they go round the circle of existence.

. . . .

But come, hearken to my words, for it is learning that increaseth wisdom. As I said before, when I declared the heads of my discourse, I shall tell thee a twofold tale. At one time it grew together to be one only out of many, at another it parted asunder so as to be many instead of one;—Fire and Water and Earth and the mighty height of Air; dread Strife, too, apart from these, of equal weight to each, and Love among them, equal in length and breadth. Her do thou contemplate with thy mind, nor sit with dazed eyes. It is she that is known as being implanted in the frame of mortals. It is she that makes them have thoughts of love and work the works of peace. They call her by the names of Joy and Aphrodite. Her has no mortal yet marked moving round among them,[1] but do thou attend to the undeceitful ordering of my discourse.

For all these are equal and alike in age, yet each has a different prerogative and its own peculiar nature. And nothing comes into being besides these, nor do they pass away; for, if they had been passing away continually, they would not be now, and what could increase this All and whence could it come? How, too, could it perish, since no place is empty of these things? They are what they are; but, running through one another, they become now this, now that,[2] and like things evermore. R. P. 166.

(18)

Love.

(19)

Clinging Love.

(20)

This (the contest of Love and Strife) is manifest in the mass of mortal limbs. At one time all the limbs that are the body's portion are brought together by Love in blooming life's high season; at another, severed by cruel Strife, they wander each alone by the breakers of life's sea. It is the same with

[1] Reading *μετὰ τοῖσιν*. I still think, however, that Knatz's palaeographically admirable conjuncture *μετὰ θεοῖσιν* (*i.e.* among the elements) deserves consideration.

[2] Keeping *ἄλλοτε* with Diels.

plants and the fish that make their homes in the waters, with the beasts that have their lairs on the hills and the seabirds that sail on wings. R. P. 173 d.

(21)

Come now, look at the things that bear witness to my earlier discourse, if so be that there was any shortcoming as to their form in the earlier list. Behold the sun, everywhere bright and warm, and all the immortal things that are bathed in heat and bright radiance.[1] Behold the rain, everywhere dark and cold; and from the earth issue forth things close-pressed and solid. When they are in strife all these are different in form and separated; but they come together in love, and are desired by one another.

For out of these have sprung all things that were and are and shall be—trees and men and women, beasts and birds and the fishes that dwell in the waters, yea, and the gods that live long lives and are exalted in honour. R. P. 166 i.

For these things are what they are; but, running through one another, they take different shapes—so much does mixture change them. R. P. 166 g.

(22)

For all of these—sun, earth, sky, and sea—are at one with all their parts that are cast far and wide from them in mortal things. And even so all things that are more adapted for mixture are like to one another and united in love by Aphrodite. Those things, again, that differ most in origin, mixture and the forms imprinted on each, are most hostile, being altogether unaccustomed to unite and very sorry by the bidding of Strife, since it hath wrought their birth.

(23)

Just as when painters are elaborating temple-offerings, men whom wisdom hath well taught their art,—they, when they have taken pigments of many colours with their hands, mix

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[1] Reading ἄμβροτα δ' ὅσσ' ἴδει with Diels. For the word ἴδος, cf. frs. 62, 5; 73, 2. The reference is to the moon, etc., which are made of solidified Air, and receive their light from the fiery hemisphere. See below, § 113.

them in due proportion, more of some and less of others, and from them produce shapes like unto all things, making trees and men and women, beasts and birds and fishes that dwell in the waters, yea, and gods, that live long lives, and are exalted in honour,—so let not the error prevail over thy mind,[1] that there is any other source of all the perishable creatures that appear in countless numbers. Know this for sure, for thou hast heard the tale from a goddess.[2]

(24)

Stepping from summit to summit, not to travel only one path to the end. . . .

(25)

What is right may well be said even twice.

(26)

For they prevail in turn as the circle comes round, and pass into one another, and grow great in their appointed turn. R. P. 166 c.

They are what they are; but, running through one another, they become men and the tribes of beasts. At one time they are all brought together into one order by Love; at another, they are carried each in different directions by the repulsion of Strife, till they grow once more into one and are wholly subdued. Thus in so far as they are wont to grow into one out of many, and again divided become more than one, so far they come into being and their life is not lasting; but in so far as they never cease changing continually, so far are they evermore, immovable in the circle.

(27)

There are distinguished neither the swift limbs of the sun, no, nor the shaggy earth in its might, nor the sea,—so fast was the god bound in the close covering of Harmony,

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[1] Reading with Blass (*Jahrb. f. kl. Phil.*, 1883, p. 19):

οὕτω μή σ' ἀπάτη φρένα καινύτω κ.τ.λ.

Cf. Hesychios: καινύτω· νικάτω. This is practically what the MSS. of Simplicius give, and Hesychios has many Empedoklean glosses.

[2] The "goddess" is, of course, the Muse. Cf. fr. 5

spherical and round, rejoicing in his circular solitude.[1] R. P. 167.

(27*a*)

There is no discord and no unseemly strife in his limbs.

(28)

But he was equal on every side and quite without end, spherical and round, rejoicing in his circular solitude.

(29)

Two branches do not spring from his back, he has no feet, no swift knees, no fruitful parts; but he was spherical and equal on every side.

(30, 31)

But when Strife was grown great in the limbs of the god and sprang forth to claim his prerogatives, in the fulness of the alternate time set for them by the mighty oath, . . . for all the limbs of the god in turn quaked. R P. 167.

(32)

The joint binds two things.

(33)

Even as when fig juice rivets and binds white milk. . . .

(34)

Cementing [2] meal with water. . . .

(35, 36)

But now I shall retrace my steps over the paths of song that I have travelled before, drawing from my saying a new saying. When Strife was fallen to the lowest depth of the vortex, and Love had reached to the centre of the whirl, in it do

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[1] The word *μονίη*, if it is right, cannot mean "rest," but only solitude. There is no reason for altering *περιηγέι*, though Simplicius has *περιγηθέι*.

[2] The masculine *κολλήσας* shows that the subject cannot have been *Φιλότης*; and Karsten was doubtless right in believing that Empedokles introduced the simile of a baker here. It is in his manner to take illustrations from human arts.

all things come together so as to be one only; not all at once, but coming together at their will each from different quarters; and, as they mingled, countless tribes of mortal creatures were scattered abroad. Yet many things remained unmixed, alternating with the things that were being mixed, namely, all that Strife not fallen yet retained; for it had not yet altogether retired perfectly from them to the outermost boundaries of the circle. Some of it still remained within, and some had passed out from the limbs of the All. But in proportion as it kept rushing out, a soft, immortal stream of blameless Love kept running in, and straightway those things became mortal which had been immortal before, those things were mixed that had been unmixed, each changing its path. And, as they mingled, countless tribes of mortal creatures were scattered abroad endowed with all manner of forms, a wonder to behold. R. P. 169.

. . . .

(37)

Earth increases its own mass, and Air swells the bulk of Air.

(38)

Come, I shall now tell thee first of all the beginning of the sun,[1] and the sources from which have sprung all the things we now behold, the earth and the billowy sea, the damp vapour and the Titan air that binds his circle fast round all things. R. P. 170 a.

(39)

If the depths of the earth and the vast air were infinite, a foolish saying which has been vainly dropped from the lips of many mortals, though they have seen but a little of the All. . . .[2] R. P. 103 b.

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[1] The MSS. of Clement have *ἥλιον ἀρχήν*, and the reading *ἡλίου ἀρχήν* is a mere makeshift. Diels reads *ἥλικά τ' ἀρχήν*, "the first (elements) equal in age."

[2] The lines are referred to Xenophanes by Aristotle, who quotes them *de Caelo*, B, 13. 294 a 21. See above, Chap. II. p. 137.

(40)

The sharp-darting sun and the gentle moon.

(41)

But (the sunlight) is gathered together and circles round the mighty heavens.

(42)

And she cuts off his rays as he goes above her, and casts a shadow on as much of the earth as is the breadth of the pale-faced moon.[1]

(43)

Even so the sunbeam, having struck the broad and mighty circle of the moon, returns at once, running so as to reach the sky.

(44)

It flashes back to Olympos with untroubled countenance. R. P. 170 c.

(45, 46)

There circles round the earth a round borrowed light, as the nave of the wheel circles round the furthest (goal).

(47)

For she gazes at the sacred circle of the lordly sun opposite.

(48)

It is the earth that makes night by coming before the lights.

(49)

. . . of solitary, blind-eyed night.

(50)

And Iris bringeth wind or mighty rain from the sea.

(51)

(Fire) swiftly rushing upwards . . .

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[1] I have translated Diels's conjecture *ἀπεστέγασεν δέ οἱ αὐγάς, | ἔστ' ἂν ἴῃ καθύπερθεν*. The MSS. have *ἀπεσκεύασεν* and *ἔστε αἶαν*.

(52)

And many fires burn beneath the earth. R. P. 171 a.

(53)

For so as it ran, it met them at that time, though often otherwise. R. P. 171 a.

(54)

But the air sank down upon the earth with its long roots. R. P. 171 a.

(55)

Sea the sweat of the earth. R. P. 170 b.

(56)

Salt was solidified by the impact of the sun's beams.

(57)

On it (the earth) many heads sprung up without necks and arms wandered bare and bereft of shoulders. Eyes strayed up and down in want of foreheads. R. P. 173 a.

(58)

Solitary limbs wandered seeking for union.

(59)

But, as divinity was mingled still further with divinity, these things joined together as each might chance, and many other things besides them continually arose.

(60)

Shambling creatures with countless hands.

(61)

Many creatures with faces and breasts looking in different directions were born; some, offspring of oxen with faces of men, while others, again, arose as offspring of men with the heads of oxen, and creatures in whom the nature of women

and men was mingled, furnished with sterile[1] parts. R. P. 173 b.

(62)

Come now, hear how the Fire as it was separated caused the night-born shoots of men and tearful women to arise; for my tale is not off the point nor uninformed. Whole-natured forms first arose from the earth, having a portion both of water and fire.[2] These did the fire, desirous of reaching its like, send up, showing as yet neither the charming form of women's limbs, nor yet the voice and parts that are proper to men. R. P. 173 c.

(63)

. . . But the substance of (the child's) limbs is divided between them, part of it in men's and part in women's (body).

(64)

And upon him came desire reminding him through sight.

(65)

. . . And it was poured out in the pure parts; and when it met with cold women arose from it.

(66)

The divided meadows of Aphhrodite.

(67)

For in its warmer part the womb brings forth males, and that is why men are dark and more manly and shaggy.

(68)

On the tenth day of the eighth month the white putrefaction arises.[3]

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[1] Reading *στείροις* with Diels, *Hermes*, xv. *loc. cit.*

[2] Retaining *εἴδεος* (*i.e.* *ἴδεος*), which is read in the MSS. of Simplicius. Cf. above, p. 243, n. 1.

[3] That Empedokles regarded milk as putrefied blood is stated by Aristotle (*de Gen. An.* Δ, 8. 777 a 7). The word *πύον* means *pus*. There may be a punning allusion to *πυός*, "beestings," but that has its vowel long.

(69)

Double bearing.[1]

(70)

Sheepskin.[2]

(71)

But if thy assurance of these things was in any way deficient as to how, out of Water and Earth and Air and Fire mingled together, arose the forms and colours of all those mortal things that have been fitted together by Aphrodite, and so are now come into being. . . .

(72)

How tall trees and the fishes in the sea . . .

(73)

And even as at that time Kypris, preparing warmth,[3] after she had moistened the Earth in water, gave it to swift fire to harden it. . . . R. P. 171.

(74)

Leading the songless tribe of fertile fish.

(75)

All of those which are dense within and rare without, having received a moisture of this kind at the hands of Kypris. . . .

(76)

This thou mayest see in the heavy-backed shell-fish that dwell in the sea, in sea-snails and the stony-skinned turtles. In them thou mayest see that the earthy part dwells on the uppermost surface.

(77-78)

It is the air that makes evergreen trees flourish with abundance of fruit the whole year round.

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[1] Said of women in reference to births in the seventh and ninth months.

[2] Of the membrane round the fœtus.

[3] Reading ἴδεα ποιπνύουσα with Diels.

(79)

And so first of all tall olive trees bear eggs. . . .

(80)

Wherefore pomegranates are late-born and apples succulent.

(81)

Wine is the water from the bark, putrefied in the wood.

(82)

Hair and leaves, and thick feathers of birds, and the scales that grow on mighty limbs, are the same thing.

(83)

But the hair of hedgehogs is sharp-pointed and bristles on their backs.

(84)

And even as when a man thinking to sally forth through a stormy night, gets him ready a lantern, a flame of blazing fire, fastening to it horn plates to keep out all manner of winds, and they scatter the blast of the winds that blow, but the light leaping out through them, shines across the threshold with unfailing beams, as much of it as is finer;[1] even so did she (Love) then entrap the elemental fire, the round pupil, confined within membranes and delicate tissues, which are pierced through and through with wondrous passages. They keep out the deep water that surrounds the pupil, but they let through the fire, as much of it as is finer. R. P. 177 b.

(85)

But the gentle flame (of the eye) has but a scanty portion of earth.

(86)

Out of these divine Aphrodite fashioned unwearying eyes.

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[1] See Beare, p. 16, n. 1, where Plato, *Tim.* 45 b 4 (*τοῦ πυρὸς ὅσον τὸ μὲν κάειν οὐκ ἔσχεν, τὸ δὲ παρέχειν φῶς ἥμερον*), is aptly quoted. Alexander *ad loc.* understands *κατὰ βηλόν* to mean *κατ' οὐρανόν*, which seems improbable.

(87)

Aphrodite fitting these together with rivets of love.

(88)

One vision is produced by both the eyes.

(89)

Know that effluences flow from all things that have come into being. R. P. 166 h.

(90)

So sweet lays hold of sweet, and bitter rushes to bitter; acid comes to acid, and warm couples with warm.

(91)

Water fits better into wine, but it will not (mingle) with oil. R. P. 166 h.

(92)

Brass mixed with tin.

(93)

The berry of the blue elder is mingled with scarlet.

(94)

And the black colour at the bottom of a river arises from the shadow. The same is seen in hollow caves.

(95)

Since they (the eyes) first grew together in the hands of Kypris.

(96)

The kindly earth received in its broad funnels two parts of gleaming Nestis out of the eight, and four of Hephaistos. So arose white bones divinely fitted together by the cement of proportion. R. P. 175.

(97)

The spine (was broken).

(98)

And the earth, anchoring in the perfect harbours of Aphrodite, meets with these in nearly equal proportions,

with Hephaistos and Water and gleaming Air—either a little more of it, or less of them and more of it. From these did blood arise and the manifold forms of flesh. R. P. 175 c.

(99)

The bell . . . the fleshy sprout (of the ear).[1]

(100)

Thus[2] do all things draw breath and breathe it out again. All have bloodless tubes of flesh extended over the surface of their bodies; and at the mouths of these the outermost surface of the skin is perforated all over with pores closely packed together, so as to keep in the blood while a free passage is cut for the air to pass through. Then, when the thin blood recedes from these, the bubbling air rushes in with an impetuous surge; and when the blood runs back it is breathed out again. Just as when a girl, playing with a water-clock of shining brass, puts the orifice of the pipe upon her comely hand, and dips the water-clock into the yielding mass of silvery water,—the stream does not then flow into the vessel, but the bulk of the air inside, pressing upon the close-packed perforations, keeps it out till she uncovers the compressed stream; but then air escapes and an equal volume of water runs in,—just in the same way, when water occupies the depths of the brazen vessel and the opening and passage is stopped up by the human hand, the air outside, striving to get in, holds the water back at the gates of the ill-sounding neck, pressing upon its surface, till she lets go with her hand. Then, on the contrary, just in the opposite way to what

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[1] On fr. 99, see Beare, p. 96, n. 1.

[2] This passage is quoted by Aristotle (*de Respir*, 473 b 9), who makes the curious mistake of taking ῥινῶν for the genitive of ῥίς instead of ῥινός. The *locus classicus* on the subject of the klepsydra is *Probl.* 914 b 9 sqq. (where read αὐλοῦ for ἄλλου, b 12). The klepsydra was a metal vessel with a narrow neck (αὐλός) at the top and with a sort of strainer (ἠθμός) pierced with holes (τρήματα, τρυπήματα) at the bottom. The passage in the *Problems* just referred to attributes this theory of the phenomenon to Anaxagoras, and we shall see later that he also made use of a similar experiment (§ 131).

happened before, the wind rushes in and an equal volume of water runs out to make room.[1] Even so, when the thin blood that surges through the limbs rushes backwards to the interior, straightway the stream of air comes in with a rushing swell; but when the blood returns the air breathes out again in equal quantity.

(101)

(The dog) with its nostrils tracking out the fragments of the beast's limbs, and the breath from their feet that they leave in the soft grass.[2]

(102)

Thus all things have their share of breath and smell.

(103, 104)

Thus have all things thought by fortune's will. . . . And inasmuch as the rarest things came together in their fall.

(105)

(The heart), dwelling in the sea of blood that runs in opposite directions, where chiefly is what men call thought; for the blood round the heart is the thought of men. R. P. 178 a.

(106)

For the wisdom of men grows according to what is before them. R. P. 177.

(107)

For out of these are all things formed and fitted together,

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[1] This seems to be the experiment described in *Probl.* 914 b 26, *ἐὰν γάρ τις αὐτῆς (τῆς κλεψύδρας) αὐτὴν τὴν κωδίαν ἐμπλήσας ὕδατος, ἐπιλαβὼν τὸν αὐλόν, καταστρέψῃ ἐπὶ τὸν αὐλόν, οὐ φέρεται τὸ ὕδωρ διὰ τοῦ αὐλοῦ ἐπὶ στόμα. ἀνοιχθέντος δὲ τοῦ στόματος, οὐκ εὐθὺς ἐκρεῖ κατὰ τὸν αὐλόν, ἀλλὰ μικροτέρῳ ὕστερον, ὡς οὐκ ὂν ἐπὶ τῷ στόματι τοῦ αὐλοῦ, ἀλλ' ὕστερον διὰ τούτου φερόμενον ἀνοιχθέντος.* The epithet *δυσηχέος* applied to *ἰσθμοῖο* is best explained as a reference to the *ἐρυγμός* or "belching" referred to at 915 a 7 as accompanying the discharge of water through the *αὐλός*. Any one can produce this effect with a water-bottle. If it were not for this epithet, it would be tempting to read *ἠθμοῖο* for *ἰσθμοῖο*. Sturz conjectured this, and it is actually the reading of a few MSS.

[2] On fr. 101, see Beare, p. 135, n. 2.

and by these do men think and feel pleasure and pain. R. P. 178.

(108)

And just so far as they grow to be different, so far do different thoughts ever present themselves to their minds (in dreams).[1] R. P. 177 a.

(109)

For it is with earth that we see Earth, and Water with water; by air we see bright Air, by fire destroying Fire. By love do we see Love, and Hate by grievous hate. R. P. 176.

(110)

For if, supported on thy steadfast mind, thou wilt contemplate these things with good intent and faultless care, then shalt thou have all these things in abundance throughout thy life, and thou shalt gain many others from them. For these things grow of themselves into thy heart, where is each man's true nature. But if thou strivest after things of another kind, as is the way with men, ten thousand woes await thee to blunt thy careful thoughts. Soon will these things desert thee when the time comes round; for they long to return once more to their own kind; for know that all things have wisdom and a share of thought.

(111)

And thou shalt learn all the drugs that are a defence against ills and old age; since for thee alone will I accomplish all this. Thou shalt arrest the violence of the weariless winds that arise and sweep the earth; and again, when thou so desirest, thou shalt bring back their blasts with a rush. Thou shalt cause for men a seasonable drought after the dark rains, and again thou shalt change the summer drought for streams that feed the trees as they pour down from the sky. Thou shalt bring back from Hades the life of a dead man.

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[1] That the reference is to dreams, we learn from Simpl. *de An.* p. 202, 30.

PURIFICATIONS

(112)

Friends, that inhabit the great town looking down on the yellow rock of Akragas, up by the citadel, busy in goodly works, harbours of honour for the stranger, men unskilled in meanness, all hail. I go about among you an immortal god, no mortal now, honoured among all as is meet, crowned with fillets and flowery garlands. Straightway, whenever I enter with these in my train, both men and women, into the flourishing towns, is reverence done me; they go after me in countless throngs, asking of me what is the way to gain; some desiring oracles, while some, who for many a weary day have been pierced by the grievous pangs of all manner of sickness, beg to hear from me the word of healing. R. P. 162 f.

(113)

But why do I harp on these things, as if it were any great matter that I should surpass mortal, perishable men?

(114)

Friends, I know indeed that truth is in the words I shall utter, but it is hard for men, and jealous are they of the assault of belief on their souls.

(115)

There is an oracle of Necessity,[1] an ancient ordinance of the gods, eternal and sealed fast by broad oaths, that whenever one of the dæmons, whose portion is length of days, has sinfully polluted his hands with blood,[2] or followed strife and forsworn himself, he must wander thrice ten thousand years from the abodes of the blessed, being born throughout the time in all manners of mortal forms, changing one toilsome

[1] Bernays conjectured *ῥῆμα*, "decree," for *χρῆμα*, but this is not necessary. Necessity is an Orphic personage, and Gorgias, the disciple of Empedokles, says *θεῶν βουλεύμασιν καὶ ἀνάγκης ψηφίσμασιν* (*Hel.* 6).

[2] I retain *φόνῳ* in v. 3 (so too Diels). The first word of v. 4 has been lost. Diels suggests *Νείκεϊ*, which may well be right, and takes *ἁμαρτήσας* as equivalent to *ὁμαρτήσας*. I have translated accordingly.

path of life for another. For the mighty Air drives him into the Sea, and the Sea spews him forth on the dry Earth; Earth tosses him into the beams of the blazing Sun, and he flings him back to the eddies of Air. One takes him from the other, and all reject him. One of these I now am, an exile and a wanderer from the gods, for that I put my trust in insensate strife. R. P. 181.

(116)

Charis loathes intolerable Necessity.

(117)

For I have been ere now a boy and a girl, a bush and a bird and a dumb fish in the sea. R. P. 182.

(118)

I wept and I wailed when I saw the unfamiliar land. R. P. 182.

(119)

From what honour, from what a height of bliss have I fallen to go about among mortals here on earth.

(120)

We have come under this roofed-in cave.[1]

(121)

. . . the joyless land, where are Death and Wrath and troops of Dooms besides; and parching Plagues and Rottennesses and Floods roam in darkness over the meadow of Ate.

(122, 123)

There were[2] Chthonie and far-sighted Heliope, bloody Discord and gentle-visaged Harmony, Kallisto and Aischre, Speed and Tarrying, lovely Truth and dark-haired Uncertainty,

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[1] According to Porphyry, who quotes this line (*de Antro Nymph.* 8), these words were spoken by the "powers" who conduct the soul into the world (ψυχοπομποὶ δυνάμεις). The "cave" is not originally Platonic but Orphic.

[2] This passage is closely modelled on the Catalogue of Nymphs in *Iliad* xviii. 39 sqq. Chthonie is found already in Pherekydes (Diog. i. 119).

Birth and Decay, Sleep and Waking, Movement and Immobility, crowned Majesty and Meanness, Silence and Voice. R. P. 182 a.

(124)

Alas, O wretched race of mortals, twice unblessed: such are the strifes and groanings from which ye have been born!

(125)

From living creatures he made them dead, changing their forms.

(126)

(The goddess) clothing them with a strange garment of flesh.[1]

(127)

Among beasts they[2] become lions that make their lair on the hills and their couch on the ground; and laurels among trees with goodly foliage. R. P. 181 b.

(128)

Nor had they[3] any Ares for a god nor Kydoimos, no nor King Zeus nor Kronos nor Poseidon, but Kypris the Queen. . . . Her did they propitiate with holy gifts, with painted figures[4] and perfumes of cunning fragrancy, with offerings of pure myrrh and sweet-smelling frankincense, casting on the ground libations of brown honey. And the altar did not reek with pure bull's blood, but this was held in the greatest abomination among men, to eat the goodly limbs after tearing out the life. R. P. 184.

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[1] I have retained *ἀλλόγνωτι* as nearer the MSS., though a little hard to interpret. On the subsequent history of the Orphic *chiton* in gnostic imagery see Bernays, *Theophr. Schr.* n. 9. It was identified with the coat of skins made by God for Adam.

[2] This is the best *μετοίκησις* (Ael. *Nat. an.* xii. 7).

[3] The dwellers in the Golden Age.

[4] The MSS. of Porphyry have *γραπτοῖς τε ζώοισι*, which is accepted by Zeller and Diels. The emendation of Bernays (adopted in R. P.) does not convince me. I venture to suggest *μακτοῖς*, on the strength of the story related by Favorinus (*ap.* Diog. viii. 53) as to the bloodless sacrifice offered by Empedokles at Olympia.

(129)

And there was among them a man of rare knowledge, most skilled in all manner of wise works, a man who had won the utmost wealth of wisdom; for whensoever he strained with all his mind, he easily saw everything of all the things that are, in ten, yea, twenty lifetimes of men.[1]

(130)

For all things were tame and gentle to man, both beasts and birds, and friendly feelings were kindled everywhere. R. P. 184 a.

(131)

If ever, as regards the things of a day, immortal Muse, thou didst deign to take thought for my endeavour, then stand by me once more as I pray to thee, O Kalliopeia, as I utter a pure discourse concerning the blessed gods. R. P. 179.

(132)

Blessed is the man who has gained the riches of divine wisdom; wretched he who has a dim opinion of the gods in his heart. R. P. 179.

(133)

It is not possible for us to set God before our eyes, or to lay hold of him with our hands, which is the broadest way of persuasion that leads into the heart of man.

(134)

For he is not furnished with a human head on his body, two branches do not sprout from his shoulders, he has no feet, no swift knees, nor hairy parts; but he is only a sacred and unutterable mind flashing through the whole world with rapid thoughts. R. P. 180.

(135)

This is not lawful for some and unlawful for others; but the law for all extends everywhere, through the wide-ruling air and the infinite light of heaven. R. P. 183.

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[1] These lines were already referred to Pythagoras by Timaios (Diog. viii. 54). As we are told (Diog. *ib.*) that some referred the verses to Parmenides, it is clear that no name was given.

(136)

Will ye not cease from this ill-sounding slaughter? See ye not that ye are devouring one another in the thoughtlessness of your hearts? R. P. 184 b.

(137)

And the father lifts up his own son in a changed form and slays him with a prayer. Infatuated fool! And they run up to the sacrificers, begging mercy, while he, deaf to their cries, slaughters them in his halls and gets ready the evil feast. In like manner does the son seize his father, and children their mother, tear out their life and eat the kindred flesh. R. P. 184 b.

(138)

Draining their life with bronze.

(139)

Ah, woe is me that the pitiless day of death did not destroy me ere ever I wrought evil deeds of devouring with my lips! R. P. 184 b.

(140)

Abstain wholly from laurel leaves.

(141)

Wretches, utter wretches, keep your hands from beans!

(142)

Him will the roofed palace of aigis-bearing Zeus never rejoice, nor yet the house of . . .

(143)

Wash your hands, cutting the water from the five springs in the unyielding bronze.[1] R. P. 184 c.

(144)

Fast from wickedness! R. P. 184 c.

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[1] On frs. 138 and 143 see Vahlen on Arist. *Poet.* 21. 1547 b 13, and Diels in *Hermes*, xv. p. 173.

(145)

Therefore are ye distraught by grievous wickednesses, and will not unburden your souls of wretched sorrows.

(146, 147)

But, at the last, they appear among mortal men as prophets, song-writers, physicians, and princes; and thence they rise up as gods exalted in honour, sharing the hearth of the other gods and the same table, free from human woes, safe from destiny, and incapable of hurt. R. P. 181 c.

(148)

. . . Earth that envelops the man.

Empedokles and Parmenides.

106. At the very outset of his poem, Empedokles is careful to mark the difference between himself and previous inquirers. He speaks angrily of those who, though their experience was only partial, professed to have found the whole (fr. 2); he even calls this "madness" (fr. 4). No doubt he is thinking of Parmenides. His own position is not, however, sceptical. He only deprecates the attempt to construct a theory of the universe off-hand instead of trying to understand each thing we come across "in the way in which it is clear" (fr. 4). And this means that we must not, like Parmenides, reject the assistance of the senses. Weak though they are (fr. 2), they are the only channels through which knowledge can enter our minds at all. We soon discover, however, that Empedokles is not very mindful of his own warnings. He too sets up a system which is to explain everything, though that system is no longer a monistic one.

It is often said that this system was an attempt to mediate between Parmenides and Herakleitos. It is not easy, however, to find any trace of specially Herakleitean doctrine in it, and it would be truer to

say that it aimed at mediating between Eleaticism and the senses. He repeats, almost in the same words, the Eleatic argument for the sole reality and indestructibility of "what *is*" (frs. 11-15); and his idea of the "Sphere" seems to be derived from the Parmenidean description of the universe as it truly is.[1] Parmenides had held that the reality which underlies the illusory world presented to us by the senses was a corporeal, spherical, continuous, eternal, and immovable *plenum*, and it is from this that Empedokles starts. Given the sphere of Parmenides, he seems to have said, How are we to get from it to the world we know? How are we to introduce motion into the immovable *plenum*? Now Parmenides need not have denied the possibility of motion within the Sphere, though he was bound to deny all motion of the Sphere itself; but such an admission on his part, had he made it, would not have served to explain anything. If any part of the Sphere were to move, the room of the displaced matter must at once be taken by other matter, for there is no empty space. This, however, would be of precisely the same kind as the matter it had displaced; for all "that *is*" is one. The result of the motion would be precisely the same as that of rest; it could account for no change. But, Empedokles must have asked, is this assumption of perfect homogeneity in the Sphere really necessary? Evidently not; it is simply the old unreasoned feeling that existence must be one. If, instead of this, we were to assume a number of existent things, it would be quite possible to apply all that Parmenides says of reality to each of them, and the forms of existence we know might be

[1] Cf. Emp. frs. 27, 28, with Parm. fr. 8.

explained by the mingling and separation of those realities. The conception of "elements" (στοιχεῖα), to use a later term,[1] was found, and the required formula follows at once. So far as concerns particular things, it is true, as our senses tell us, that they come into being and pass away; but, if we have regard to the ultimate elements of which they are composed, we shall say with Parmenides that "what *is*" is uncreated and indestructible (fr. 17).

107. The "four roots" of all things (fr. 6) which Empedokles assumed were those that have become traditional—Fire, Air, Earth, and Water. It is to be noticed, however, that he does not call Air *ἀήρ*, but *αἰθήρ*, and this must be because he wished to avoid any confusion with what had hitherto been meant by the former word. He had, in fact, made the great discovery that atmospheric air is a distinct corporeal substance, and is not to be identified with empty space on the one hand or rarefied mist on the other. Water is not liquid air, but something quite different.[2] This truth Empedokles demonstrated by means of the apparatus known as the *klepsydra*, and we still possess the verses in which he applied his discovery to the explanation of respiration and the motion of the blood (fr. 100). Aristotle laughs at those who try to show there is no empty space by shutting up air in water-clocks and torturing wineskins. They only prove, he says, that air is a thing.[3] That, however, is exactly

The "four roots."

[1] For the history of the term στοιχεῖον see Diels, *Elementum*. Eudemos said (*ap.* Simpl. *Phys.* p. 7, 13) that Plato was the first to use it, and this is confirmed by the way the word is introduced in *Tht.* 201 e. The original term was *μορφή* or *ἰδέα*.

[2] Cf. Chap. I. § 27.

[3] Arist. *Phys.* Δ, 6, 213 a 22 (R. P. 159). Aristotle only mentions Anaxagoras by name in this passage; but he speaks in the plural, and we know from fr. 100 that the *klepsydra* experiment was used by Empedokles.

what Empedokles intended to prove, and it was one of the most important discoveries in the early history of science. It will be convenient for us to translate the *αἰθήρ* of Empedokles by "air"; but we must be careful in that case not to render the word *ἀήρ* in the same way. Anaxagoras seems to have been the first to use it of atmospheric air.

Empedokles also called the "four roots" by the names of certain divinities—"shining Zeus, life-bringing Hera, Aidoneus, and Nestis" (fr. 6)—though there is some doubt as to how these names are to be apportioned among the elements. Nestis is said to have been a Sicilian water-goddess, and the description of her shows that she stands for Water; but there is a conflict of opinion as to the other three. This, however, need not detain us.[1] We are already prepared to find that Empedokles called the elements gods; for all the early thinkers had spoken in this way of whatever they regarded as the primary substance.

[1] In antiquity the Homeric Allegorists made Hera Earth and Aidoneus Air, a view which has found its way into Aetios from Poseidonios. It arose as follows. The Homeric Allegorists were not interested in the science of Empedokles, and did not see that his *αἰθήρ* was quite a different thing from Homer's *ἀήρ*. Now this is the dark element, and night is a form of it, so it would naturally be identified with Aidoneus. Again, Empedokles calls Hera *φερέσβιος*, and that is an old epithet of Earth in Homer. Another view current in antiquity identified Hera with Air, which is the theory of Plato's *Cratylus*, and Aidoneus with Earth. The Homeric Allegorists further identified Zeus with Fire, a view to which they were doubtless led by the use of the word *αἰθήρ*. Now *αἰθήρ* certainly means Fire in Anaxagoras, as we shall see, but there is no doubt that in Empedokles it meant Air. It seems likely, then, that Knatz is right ("Empedoclea" in *Schedae Philologicae Hermanno Usenero oblatae*, 1891, pp. 1 sqq.) in holding that the bright Air of Empedokles was Zeus. This leaves Aidoneus to stand for Fire; and nothing could have been more natural for a Sicilian poet, with the volcanoes and hot springs of his native island in mind, than this identification. He refers to the fires that burn beneath the Earth himself (fr. 52). If that is so, we shall have to agree with the Homeric Allegorists that Hera is Earth; and there is certainly no improbability in that.

We must only remember that the word is not used in its religious sense. Empedokles did not pray or sacrifice to the elements, and the use of divine names is in the main an accident of the poetical form in which he cast his system.

Empedokles regarded the "roots of all things" as eternal. Nothing can come from nothing or pass away into nothing (fr. 12); what is *is*, and there is no room for coming into being and passing away (fr. 8). Further, Aristotle tells us, he taught that they were unchangeable.[1] This Empedokles expressed by saying that "they are what they are" (frs. 17, 34; 21, 13), and are "always alike." Again, they are all "equal," a statement which seemed strange to Aristotle,[2] but was quite intelligible in the days of Empedokles. Above all, the elements are ultimate. All other bodies, as Aristotle puts it, might be divided till you came to the elements; but Empedokles could give no further account of these without saying (as he did not) that there is an element of which Fire and the rest are in turn composed.[3]

The "four roots" are given as an exhaustive enumeration of the elements (fr. 23 *sub fin.*); for they account for all the qualities presented by the world to the senses. When we find, as we do, that the school of medicine which regarded Empedokles as its founder

[1] Arist. *de Gen. Corr.* B, 1. 329 b 1. [2] *Ibid.* B, 6. 333 a 16.

[3] *Ibid.* A, 8. 325 b 19 (R. P. 164 e). This was so completely misunderstood by later writers that they actually attribute to Empedokles the doctrine of στοιχεῖα πρὸ τῶν στοιχείων (Aet. i. 13, 1; 17, 3). The criticism of the Pythagoreans and Plato had made the hypothesis of elements almost unintelligible to Aristotle, and *a fortiori* to his successors. As Plato put it (*Tim.* 48 b 8), they were "not even syllables," let alone "letters" (στοιχεῖα). That is why Aristotle, who derived them from something more primary, calls them τὰ καλούμενα στοιχεῖα (Diels, *Elementum*, p. 25).

identified the four elements with the "opposites," the hot and the cold, the moist and the dry, which formed the theoretical foundation of its system, we see at once how the theory is related to previous views of reality.[1] To put it shortly, what Empedokles did was to take the opposites of Anaximander and to declare that they were "things," each of which was real in the Parmenidean sense. We must remember that the conception of quality had not yet been formed. Anaximander had no doubt regarded his "opposites" as things; though, before the time of Parmenides, no one had fully realised how much was implied in saying that anything is a thing. That is the stage we have now reached. There is still no conception of quality, but there is a clear apprehension of what is involved in saying that a thing *is*.

Aristotle twice[2] makes the statement that, though Empedokles assumes four elements, he treats them as two, opposing Fire to all the rest. This, he says, we can see for ourselves from his poem. So far as the general theory of the elements goes, it is impossible to see anything of the sort; but, when we come to the origin of the world (§ 112), we shall find that Fire certainly plays a leading part, and this may be what Aristotle meant. It is also true that in the biology (§§ 114-116) Fire fulfils a unique function, while the other three act more or less in the same way. But we must remember that it has no pre-eminence over the rest: all are equal.

Strife and Love.

108. The Eleatic criticism had made it necessary for

[1] We know from Menon that Philistion put the matter in this way. See p. 235, n. 2.

[2] Arist. *Met.* A, 4. 985 a 31; *de Gen. Corr.* B, 3. 330 b 19 (R. P. 164 e).

subsequent thinkers to explain motion.[1] Empedokles starts, as we have seen, from an original state of the "four roots," which only differs from the Sphere of Parmenides in so far as it is a mixture, not a homogeneous and continuous mass. The fact that it is a mixture makes change and motion possible; but, were there nothing outside the Sphere which could enter in, like the Pythagorean "Air," to separate the four elements, nothing could ever arise from it. Empedokles accordingly assumed the existence of such a substance, and he gave it the name of Strife. But the effect of this would be to separate all the elements in the Sphere completely, and then nothing more could possibly happen; something else was needed to bring the elements together again. This Empedokles found in Love, which he regarded as the same impulse to union that is implanted in human bodies (fr. 17, 22 sqq.). He looks at it, in fact, from a purely physiological point of view, as was natural for the founder of a medical school. No mortal had yet marked, he says, that the very same Love which men know in their bodies had a place among the elements.

It is important to observe that the Love and Strife of Empedokles are no incorporeal forces, but corporeal elements like the other four. At the time, this was inevitable; nothing incorporeal had yet been dreamt of. Naturally, Aristotle is puzzled by this characteristic of what he regarded as efficient causes. "The Love of Empedokles," he says,[2] "is both an efficient cause, for it brings things together, and a material cause, for it is a part of the mixture." And Theophrastos

[1] Cf. Introd. § VIII. [2] Arist. *Met.* A, 10. 1075 b 3.

expressed the same idea by saying[1] that Empedokles sometimes gave an efficient power to Love and Strife, and sometimes put them on a level with the other four. The verses of Empedokles himself leave no room for doubt that the two were thought of as spatial and corporeal. All the six are called "equal." Love is said to be "equal in length and breadth" to the others, and Strife is described as equal to each of them in weight (fr. 17).

The function of Love is to produce union; that of Strife, to break it up again. Aristotle, however, rightly points out that in another sense it is Love that divides and Strife that unites. When the Sphere is broken up by Strife, the result is that all the Fire, for instance, which was contained in it comes together and becomes one; and again, when the elements are brought together once more by Love, the mass of each is divided. In another place, he says that, while Strife is assumed as the cause of destruction, and does, in fact, destroy the Sphere, it really gives birth to everything else in so doing.[2] It follows that we must carefully distinguish between the Love of Empedokles and that "attraction of like for like" to which he also attributed an important part in the formation of the world. The latter is not an element distinct from the others; it depends, we shall see, on the proper nature of each element, and is only able to take effect when Strife divides the Sphere. Love, on the contrary, is something that comes from outside and produces an attraction of *unlikes*.

[1] Theophr. *Phys. Op.* fr. 3 (*Dox.* p. 477); *ap.* Simpl. *Phys.* p. 25, 21 (R. P. 166 b).

[2] Arist. *Met.* A, 4. 985 a 21; Γ, 4. 1000 a 24; b 9 (R. P. 166 i).

Mixture and separation.

109. But, when Strife has once separated the elements, what is it that determines the direction of their motion? Empedokles seems to have given no further explanation than that each was "running" in a certain direction (fr. 53). Plato severely condemns this in the *Laws*,[1] on the ground that no room is thus left for design. Aristotle also blames him for giving no account of the Chance to which he ascribed so much importance. Nor is the Necessity, of which he also spoke, further explained.[2] Strife enters into the Sphere at a certain time in virtue of Necessity, or "the mighty oath" (fr. 30); but we are left in the dark as to the origin of this.

The expression used by Empedokles to describe the movement of the elements is that they "run through each other" (fr. 17, 34). Aristotle tells us[3] that he explained mixture in general by "the symmetry of pores." And this is the true explanation of the "attraction of like for like." The "pores" of like bodies are, of course, much the same size, and these bodies can therefore mingle easily. On the other hand, a finer body will "run through" a coarse one without becoming mixed, and a coarse body will not be able to enter into the pores of a finer one at all. It will be observed that, as Aristotle says, this really implies something like the atomic theory; but there is no evidence that Empedokles himself was conscious of that. Another question raised by Aristotle is even more instructive. Are the pores, he asks, empty or full? If empty, what becomes of the denial of the

[1] Plato, *Laws*, x. 889 b. The reference is not to Empedokles exclusively, but the language shows that Plato is thinking mainly of him.
[2] Arist. *de Gen. Corr.* B, 6. 334 a 1; *Phys.* Θ, 1. 252 a 5 (R. P. 166 k).
[3] *Ibid.* A, 8. 324 b 34 (R. P. 166 h).

void? If full, why need we assume pores at all?[1] These questions Empedokles would have found it hard to answer. They point to a real want of thoroughness in his system, and mark it as a mere stage in the transition from Monism to Atomism.

The four periods.

110. It will be clear from all this that we must distinguish four periods in the cycle. First we have the Sphere, in which all the elements are mixed together by Love. Secondly, there is the period when Love is passing out and Strife coming in, when, therefore, the elements are partially separated and partially combined. Thirdly, comes the complete separation of the elements, when Love is outside the world, and Strife has given free play to the attraction of like for like. Lastly, we have the period when Love is bringing the elements together again, and Strife is passing out. This brings us back in time to the Sphere, and the cycle begins afresh. Now a world such as ours can exist only in the second and fourth of these periods; and it is clear that, if we are to understand Empedokles, we must discover in which of these we now are. It seems to be generally supposed that we are in the fourth period;[2] I hope to show that we are really in the second, that when Strife is gaining the upper hand.

Our world the work of Strife.

111. That a world of perishable things arises both in the second and fourth period is distinctly stated by Empedokles (fr. 17), and it is inconceivable that he

[1] Arist. *de Gen. Corr.* 326 b 6.

[2] This is the view of Zeller (pp. 785 sqq.), but he admits that the external testimony, especially that of Aristotle, is wholly in favour of the other. His difficulty is with the fragments, and if it can be shown that these can be interpreted in accordance with Aristotle's statements, the question is settled. Aristotle was specially interested in Empedokles, and was not likely to misrepresent him on such a point.

himself had not made up his mind which of these worlds is ours. Aristotle is clearly of opinion that it is the world which arises when Strife is increasing. In one place, he says that Empedokles "holds that the world is in a similar condition now in the period of Strife as formerly in that of Love."[1] In another, he tell us that Empedokles omits the generation of things in the period of Love, just because it is unnatural to represent this world, in which the elements are separate, as arising from things in a state of separation.[2] This remark can only mean that the scientific theories contained in the poem of Empedokles assumed the increase of Strife, or, in other words, that they represented the course of evolution as the disintegration of the Sphere, not as the gradual coming together of things from a state of separation.[3] That is only what we should expect, if we are right in supposing that the problem he set himself to solve was the origin of this world from the Sphere of Parmenides, and it is also in harmony with the universal tendency of such speculations to represent the world as getting worse rather than better. We have only to consider, then, whether the details of the system bear out this general view.

Formation of the world by Strife.

112. To begin with the Sphere, in which the "four roots of all things" are mixed together, we note in the

[1] Arist. *de Gen. Corr.* B, 6. 334 a 6: *τὸν κόσμον ὁμοίως ἔχειν φησὶν ἐπί τε τοῦ νείκους νῦν καὶ πρότερον ἐπὶ τῆς φιλίας.*

[2] Arist. *de Caelo*, Γ, 2. 301 a 14: *ἐκ διεστώτων δὲ καὶ κινουμένων οὐκ εὔλογον ποιεῖν τὴν γένεσιν. διὸ καὶ Ἐμπεδοκλῆς παραλείπει τὴν ἐπὶ τῆς φιλότητος· οὐ γὰρ ἂν ἠδύνατο συστῆσαι τὸν οὐρανὸν ἐκ κεχωρισμένων μὲν κατασκευάζων, σύγκρισιν δὲ ποιῶν διὰ τὴν φιλότητα· ἐκ διακεκριμένων γὰρ συνέστηκεν ὁ κόσμος τῶν στοιχείων* ("our world consists of the elements in a state of separation"), *ὥστ' ἀναγκαῖον γενέσθαι ἐξ ἑνὸς καὶ συγκεκριμένου.*

[3] It need not mean that Empedokles said nothing about the world of Love at all; for he obviously says something of both worlds in fr. 17. It is enough to suppose that, having described both in general terms, he went on to treat the world of Strife in detail.

first place that it is called a god in the fragments just as the elements are, and that Aristotle more than once refers to it in the same way.[1] We must remember that Love itself is a part of this mixture,[2] while Strife surrounds or encompasses it on every side just as the Boundless encompasses the world in earlier systems. Strife, however, is not boundless, but equal in bulk to each of the four roots and to Love.

At the appointed time, Strife begins to enter into the Sphere and Love to go out of it (frs. 30, 31). The fragments by themselves throw little light on this; but Aetios and the Plutarchean *Stromateis* have between them preserved a very fair tradition of what Theophrastos said on the point.

Empedokles held that Air was first separated out and secondly Fire. Next came Earth, from which, highly compressed as it was by the impetus of its revolution, Water gushed forth. From the water Mist was produced by

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[1] Arist. *de Gen. Corr.* B, 6. 333 b 21 (R. P. 168 e); *Met.* B, 4. 1000 a 29 (R. P. 166 i). Cf. Simpl. *Phys.* p. 1124, 1 (R. P. 167 b). In other places Aristotle speaks of it as "the One." Cf. *de Gen. Corr.* A, 1. 315 a 7 (R. P. 168 e); *Met.* B, 4. 1000 a 29 (R. P. 166 i); A, 4. 985 a 28 (R. P. *ib.*). This, however, involves a slight Aristotelian "development." It is not quite the same thing to say, as Empedokles does, that all things come together "into one," and to say that they come together "into the One." The latter expression suggests that they lose their distinct and proper character in the Sphere, and thus become something like Aristotle's own "matter." As has been pointed out (p. 265, n. 3), it is hard for Aristotle to grasp the conception of irreducible elements; but there can be no doubt that in the Sphere, as in their separation, the elements remain "what they are" for Empedokles. As Aristotle also knows quite well, the Sphere is a mixture. Compare the difficulties about the "One" of Anaximander discussed in Chap. I. § 15.

[2] This accounts for Aristotle's statement, which he makes once positively (*Met.* B, 1. 996 a 7) and once very doubtfully (*Met.* Γ, 4. 1001 a 12), that Love was the substratum of the One in just the same sense as the Fire of Herakleitos, the Air of Anaximenes, or the Water of Thales. He thinks that all the elements become merged in Love, and so lose their identity. In this case, it is in Love he recognises his own "matter."

evaporation. The heavens were formed out of the Air and the sun out of the Fire, while terrestrial things were condensed from the other elements. Aet. ii. 6. 3 (*Dox.* p. 334; R. P. 170).

Empedokles held that the Air when separated off from the original mixture of the elements was spread round in a circle. After the Air, Fire running outwards, and not finding any other place, ran up under the solid that surrounded the Air.[1] There were two hemispheres revolving round the earth, the one altogether composed of fire, the other of a mixture of air and a little fire. The latter he supposed to be the Night. The origin of their motion he derived from the fact of fire preponderating in one hemisphere owing to its accumulation there. Ps.-Plut. *Strom.* fr. 10 (*Dox.* p. 582; R. P. 170 a).

The first of the elements to be separated out by Strife, then, was Air, which took the outermost position surrounding the world (cf. fr. 38). We must not, however, take the statement that it surrounded the world "in a circle" too strictly. It appears that Empedokles regarded the heavens as shaped like an egg.[2] Here, probably, we have a trace of Orphic ideas. At any rate, the outer circle of the Air became solidified or frozen, and we thus get a crystalline vault as the boundary of the world. We note that it was Fire which solidified the Air and turned it to ice. Fire in general had a solidifying power.[3]

In its upward rush Fire displaced a portion of the Air in the upper half of the concave sphere formed by the frozen sky. This air then sunk downwards, carrying with it a small portion of the fire. In this

[1] For the phrase *τοῦ περὶ τὸν ἀέρα πάγου* cf. *Περὶ διαίτης*, i. 10, 1, *πρὸς τὸν περιέχοντα πάγον*. *Et. M. s.v.* *βηλός . . . τὸν ἀνωτάτω πάγον καὶ περιέχοντα τὸν πάντα ἀέρα.* This probably comes ultimately from Anaximenes. Cf. Chap. I. p. 82, n. 1.

[2] Aet. ii. 31, 4 (*Dox.* p. 363).

[3] Aet. ii. 11, 2 (R. P. 170 c).

way, two hemispheres were produced: one, consisting entirely of fire, the diurnal hemisphere; the other, the nocturnal, consisting of air with a little fire.

The accumulation of Fire in the upper hemisphere disturbs the equilibrium of the heavens and causes them to revolve; and this revolution not only produces the alternation of day and night, but by its rapidity keeps the heavens and the earth in their places. This was illustrated, Aristotle tells us, by the simile of a cup of water whirled round at the end of a string.[1] The verses which contained this remarkable account of so-called "centrifugal force" have been lost; but the experimental illustration is in the manner of Empedokles.

The sun, moon, stars, and earth.

113. It will be observed that day and night have been explained without reference to the sun. Day is produced by the light of the fiery diurnal hemisphere, while night is the shadow thrown by the earth when the fiery hemisphere is on the other side of it (fr. 48). What, then, is the sun? The Plutarchean *Stromateis*[2] again give us the answer: "The sun is not fire in substance, but a reflexion of fire like that which comes from water." Plutarch himself makes one of his personages say: "You laugh at Empedokles for saying that the sun is a product of the earth, arising from the reflexion of the light of heaven, and once more 'flashes back to Olympos with untroubled countenance.'"[3]

[1] Arist. *de Caelo*, B, 13. 295 a 16 (R. P. 170 b). The experiment with *τὸ ἐν τοῖς κυάθοις ὕδωρ*, which *κύκλῳ τοῦ κυάθου φερομένου πολλάκις κάτω τοῦ χαλκοῦ γινόμενον ὅμως οὐ φέρεται κάτω*, reminds us of the experiment with the *klepsydra* in fr. 100.

[2] [Plut.] *Strom.* fr. 10 (*Dox.* p. 582, 11; R. P. 170 c).

[3] Plut. *de Pyth. Or.* 400 b (R. P. 170 c). We must keep the MS. reading *περὶ γῆν* with Bernardakis and Diels. The reading *περιαυγῆ* in R. P. is a conjecture of Wyttenbach's; but cf. Aet. ii. 20, 13, quoted in the next note.

Aetios says:[1] "Empedokles held that there were two suns: one, the archetype, the fire in one hemisphere of the world, filling the whole hemisphere always stationed opposite its own reflexion; the other, the visible sun, its reflexion in the other hemisphere, that which is filled with air mingled with fire, produced by the reflexion of the earth, which is round, on the crystalline sun, and carried round by the motion of the fiery hemisphere. Or, to sum it up shortly, the sun is a reflexion of the terrestrial fire."

These passages, and especially the last, are by no means clear. The reflexion which we call the sun cannot be in the hemisphere opposite to the fiery one; for that is the nocturnal hemisphere. We must say rather that the light of the fiery hemisphere is reflected by the earth on to the fiery hemisphere itself in one concentrated flash. From this it follows that the appearance which we call the sun is the same size as the earth. We may explain the origin of this view as follows. It had just been discovered that the moon shone by reflected light, and there is always a tendency to give any novel theory a wider application than it really admits of. In the early part of the fifth century B.C., men saw reflected light everywhere; the Pythagoreans held a very similar view, and when we come to them, we shall see why Aetios, or rather his source, expresses it by speaking of "two suns."

[1] Aet. ii. 20, 13 (*Dox.* p. 350), Ἐμπεδοκλῆς δύο ἡλίους· τὸν μὲν ἀρχέτυπον, πῦρ ὂν ἐν τῷ ἑτέρῳ ἡμισφαιρίῳ τοῦ κόσμου, πεπληρωκὸς τὸ ἡμισφαίριον, αἰεὶ κατ᾽ ἀντικρὺ τῇ ἀνταυγείᾳ ἑαυτοῦ τεταγμένον· τὸν δὲ φαινόμενον, ἀνταύγειαν ἐν τῷ ἑτέρῳ ἡμισφαιρίῳ τῷ τοῦ ἀέρος τοῦ θερμομιγοῦς πεπληρωμένῳ, ἀπὸ κυκλοτεροῦς τῆς γῆς κατ᾽ ἀνάκλασιν γιγνομένην εἰς τὸν ἥλιον τὸν κρυσταλλοειδῆ, συμπεριελκομένην δὲ τῇ κινήσει τοῦ πυρίνου. ὡς δὲ βραχέως εἰρῆσθαι συντεμόντα, ἀνταύγειαν εἶναι τοῦ περὶ τὴν γῆν πυρὸς τὸν ἥλιον.

It was probably in this connexion that Empedokles announced that light takes some time to travel, though its speed is so great as to escape our perception.[1]

"The moon," we are told, "was composed of air cut off by the fire; it was frozen just like hail, and had its light from the sun." It is, in other words, a disc of frozen air, of the same substance as the solid sky which surrounds the heavens. Diogenes says that Empedokles taught it was smaller than the sun, and Aetios tells us it was only half as distant from the earth.[2]

Empedokles did not attempt to explain the fixed stars by reflected light, nor even the planets. They were fiery, made out of the fire which the air carried with it when forced beneath the earth by the upward rush of fire at the first separation, as we saw above. The fixed stars were attached to the frozen air; the planets moved freely.[3]

Empedokles was acquainted (fr. 42) with the true theory of solar eclipses, which, along with that of the moon's light, was the great discovery of this period. He also knew (fr. 48) that night is the conical shadow of the earth, and not a sort of exhalation.

Wind was explained from the opposite motions of the fiery and airy hemispheres. Rain was caused by the compression of the Air, which forced any water there might be in it out of its pores in the form of drops. Lightning was fire forced out from the clouds in much the same way.[4]

[1] Arist. *de Sensu*, 6. 446 a 28; *de An.* B, 7. 418 b 20.

[2] [Plut.] *Strom.* fr. 10 (*Dox.* p. 582, 12; R. P. 170 c); Diog. viii. 77; Aet. ii. 31, 1 (cf. *Dox.* p. 63).

[3] Aet. ii. 13, 2 and 11 (*Dox.* pp. 341 sqq.).

[4] Aet. iii. 3, 7; Arist. *Meteor.* B, 9. 369 b 12, with Alexander's commentary.

The earth was at first mixed with water, but the increasing compression caused by the velocity of the world's revolution made the water gush forth, so that the sea is called "the sweat of the earth," a phrase to which Aristotle objects as a mere poetical metaphor. The saltness of the sea was explained by the help of this analogy.[1]

114. Empedokles went on to show how the four elements, mingled in different proportions, gave rise to perishable things, such as bones, flesh, and the like. These, of course, are the work of Love; but this in no way contradicts the view taken above as to the period of evolution to which this world belongs. Love is by no means banished from the world yet, though one day it will be. At present, it is still able to form combinations of elements; but, just because Strife is ever increasing, they are all perishable. Organic combinations.

The possibility of organic combinations depends upon the fact that there is still water in the earth, and even fire (fr. 52). The warm springs of Sicily were a proof of this, not to speak of Etna. These springs Empedokles appears to have explained by one of his characteristic images, drawn this time from the heating of warm baths.[2] It will be noted that his similes are nearly all drawn from human inventions and manufactures.

115. Plants and animals were formed from the four elements under the influence of Love and Strife. Plants.

[1] Arist. *Meteor.* B, 3. 357 a 24; Aet. iii. 16, 3 (R. P. 170 b). Cf. the clear reference in Arist. *Meteor.* B, 1. 353 b 11.

[2] Seneca, *Q. Nat.* iii. 24: "facere solemus dracones et miliaria et complures formas in quibus aere tenui fistulas struimus per declive circumdatas, ut saepe eundem ignem ambiens aqua per tantum fluat spatii quantum efficiendo calori sat est. frigida itaque intrat, effluit calida. idem sub terra Empedocles existimat fieri."

The fragments which deal with trees and plants are 77-81; and these, taken along with certain Aristotelian statements and the doxographical tradition, enable us to make out pretty fully what the theory was. The text of Aetios is very corrupt here; but it may, perhaps, be rendered as follows:—

Empedokles says that trees were the first living creatures to grow up out of the earth, before the sun was spread out, and before day and night were distinguished; that, from the symmetry of their mixture, they contain the proportion of male and female; that they grow, rising up owing to the heat which is in the earth, so that they are parts of the earth just as embryos are parts of the uterus; that fruits are excretions of the water and fire in plants, and that those which have a deficiency of moisture shed their leaves when that is evaporated by the summer heat, while those which have more moisture remain evergreen, as in the case of the laurel, the olive, and the palm; that the differences in taste are due to variations in the particles contained in the earth and to the plants drawing different particles from it, as in the case of vines; for it is not the difference of the vines that makes wine good, but that of the soil which nourishes them. Aet. v. 26, 4 (R. P. 172).

Aristotle finds fault with Empedokles for explaining the double growth of plants, upwards and downwards, by the opposite natural motions of the earth and fire contained in them.[1] For "natural motions" we must, of course, substitute the attraction of like for like (§ 109). Theophrastos says much the same thing.[2] The growth of plants, then, is to be regarded as an incident in that separation of the elements which Strife is bringing about. Some of the fire which is still beneath the earth (fr. 52) meeting in its upward

[1] Arist. *de An.* B, 4. 415 b 28.
[2] Theophr. *de causis plantarum*, i. 12, 5.

course with earth, still moist with water and "running" down so as to "reach its own kind," unites with it, under the influence of the Love still left in the world, to form a temporary combination, which we call a tree or a plant.

At the beginning of the pseudo-Aristotelian *Treatise on Plants*,[1] we are told that Empedokles attributed desire, sensation, and the capacity for pleasure and pain to plants, and he rightly saw that the two sexes are combined in them. This is mentioned by Aetios, and discussed in the pseudo-Aristotelian treatise. If we may so far trust that Byzantine translation from a Latin version of the Arabic,[2] we get a most valuable hint as to the reason. Plants, we are there told, came into being "in an imperfect state of the world,"[3] in fact, at a time when Strife had not so far prevailed as to differentiate the sexes. We shall see that the same thing applies to the original race of animals in this world. It is strange that Empedokles never observed the actual process of generation in plants, but confined himself to the statement that they spontaneously "bore eggs" (fr. 79), that is to say, fruit.

116. The fragments which deal with the evolution of animals (57-62) must be understood in the light of the statement (fr. 17) that there is a double coming into being and a double passing away of mortal things. Empedokles describes two processes of evolution, which take exactly opposite courses, one of them Evolution of animals.

[1] [Arist.] *de plantis*, A, 1. 815 a 15.

[2] Alfred the Englishman translated the Arabic version into Latin in the reign of Henry III. It was retranslated from this version into Greek at the Renaissance by a Greek resident in Italy.

[3] A, 2. 817 b 35, "mundo . . . diminuto et non perfecto in complemento suo" (Alfred).

belonging to the period of Love and the other to that of Strife. The four stages of this double evolution are accurately distinguished in a passage of Aetios,[1] and we shall see that there is evidence for referring two of them to the second period of the world's history and two to the fourth.

The first stage is that in which the various parts of animals arise separately. It is that of heads without necks, arms without shoulders, and eyes without foreheads (fr. 57). It is clear that this must be the first stage in what we have called the fourth period of the world's history, that in which Love is coming in and Strife passing out. Aristotle distinctly refers it to the period of Love, by which, as we have seen, he means the period when Love is increasing.[2] It is in accordance with this that he also says these scattered members were subsequently put together by Love.[3]

The second stage is that in which the scattered limbs are united. At first, they were combined in all possible ways (fr. 59). There were oxen with human heads, creatures with double faces and double breasts, and all manner of monsters (fr. 61). Those of them that were fitted to survive did so, while the rest perished. That is how the evolution of animals took place in the period of Love.[4]

[1] Aet. v. 19, 5 (R. P. 173). Plato has made use of the idea of reversed evolution in the *Politicus* myth.

[2] Arist. *de Caelo*, Γ, 2. 300 b 29 (R. P. 173 a). Cf. *de Gen. An.* A, 17. 722 b 17, where fr. 57 is introduced by the words *καθάπερ Ἐμπεδοκλῆς γεννᾷ ἐπὶ τῆς Φιλότητος*. Simplicius, *de Caelo*, p. 587, 18, expresses the same thing by saying *μουνομελῆ ἔτι τὰ γυῖα ἀπὸ τῆς τοῦ Νείκους διακρίσεως ὄντα ἐπλανᾶτο*.

[3] Arist. *de An.* Γ, 6. 430 a 30 (R. P. 173 a).

[4] This is well put by Simplicius, *de Caelo*, p. 587, 20. It is *ὅτε τοῦ Νείκους ἐπεκράτει λοιπὸν ἡ Φιλότης . . . ἐπὶ τῆς Φιλότητος οὖν ὁ Ἐμπεδοκλῆς ἐκεῖνα εἶπεν, οὐχ ὡς ἐπικρατούσης ἤδη τῆς Φιλότητος, ἀλλ' ὡς μελλούσης*

The third stage belongs to the period when the unity of the Sphere is being destroyed by Strife. It is, therefore, the first stage in the evolution of our present world. It begins with "whole-natured forms" in which there is not as yet any distinction of sex or species.[1] They are composed of earth and water, and are produced by the upward motion of fire which is seeking to reach its like.

In the fourth stage, the sexes and species have been separated, and new animals no longer arise from the elements, but are produced by generation. We shall see presently how Empedokles conceived this to operate.

In both these processes of evolution, Empedokles was guided by the idea of the survival of the fittest. Aristotle severely criticises this. "We may suppose," he says, "that all things have fallen out accidentally just as they would have done if they had been produced for some end. Certain things have been preserved because they had spontaneously acquired a fitting structure, while those which were not so put together have perished and are perishing, as Empedokles says of the oxen with human faces."[2] This, according to Aristotle, leaves too much to chance. One curious instance has been preserved. Vertebration was explained by saying that an early invertebrate animal tried to turn round and broke its back in so doing. This was a favourable variation and so survived.[3] It should be noted that it clearly belongs to the period of Strife, and not, like

ἐπικρατεῖν. In *Phys.* p. 371, 33, he says the oxen with human heads were *κατὰ τὴν τῆς Φιλίας ἀρχήν*.

[1] Cf. Plato, *Symp.* 189 e.

[2] Arist. *Phys.* B, 8. 198 b 29 (R. P. 173 a).

[3] Arist. *de Part. An.* A, 1. 640 a 19.

the oxen with human heads, to that of Love. The survival of the fittest was the law of both processes of evolution.

Physiology.

117. The distinction of the sexes was an important result of the gradual differentiation brought about by the entrance of Strife into the world. Empedokles differed from the theory given by Parmenides in his Second Part (§ 95) in holding that the warm element preponderated in the male sex, and that males were conceived in the warmer part of the uterus (fr. 65). The fœtus was formed partly from the male and partly from the female semen (fr. 63); and it was just the fact that the substance of a new being's body was divided between the male and the female that produced desire when the two were brought together by sight (fr. 64). A certain symmetry of the pores in the male and female semen is, of course, necessary for procreation, and from its absence Empedokles explained the sterility of mules. The children most resemble that parent who contributed most to their formation. The influence of statues and pictures was also noted, however, as modifying the appearance of the offspring. Twins and triplets were due to a superabundance and division of the semen.[1]

As to the growth of the fœtus in the uterus, Empedokles held that it was enveloped in a membrane, and that its formation began on the thirty-sixth day and was completed on the forty-ninth. The heart was formed first, the nails and such things last. Respiration did not begin till the time of birth, when the fluids round the fœtus were withdrawn. Birth took place in the ninth or seventh month, because the day had

[1] Aet. v. 10, 1; 11, 1; 12, 2; 14, 2. Cf. Fredrich, *Hippokratische Untersuchungen*, pp. 126 sqq.

been originally nine months long, and afterwards seven. Milk arises on the tenth day of the eighth month (fr. 68).[1]

Death was the final separation by Strife of the fire and earth in the body, each of which had all along been striving to "reach its own kind." Sleep was a temporary separation to a certain extent of the fiery element.[2] At death the animal is resolved into its elements, which perhaps enter into fresh combinations, perhaps become permanently united with "their own kind." There can be no question here of an immortal soul.

Even in life, we may see the attraction of like to like operating in animals just as it did in the upward and downward growth of plants. Hair is the same thing as foliage (fr. 82); and, generally speaking, the fiery part of animals tends upwards and the earthy part downwards, though there are exceptions, as may be seen in the case of certain shell-fish (fr. 76), where the earthy part is above. These exceptions are only possible because there is still a great deal of Love in the world. We also see the attraction of like for like in the different habits of the various species of animals. Those that have most fire in them fly up into the air; those in which earth preponderates take to the earth, as did the dog which always sat upon a tile.[3] Aquatic animals are those in which water predominates. This does not, however, apply to fishes, which are very fiery, and take to the water to cool themselves.[4]

[1] Aet. v. 15, 3; 21, 1 (*Dox.* p. 190).
[2] Aet. v. 25, 4 (*Dox.* p. 437).
[3] Aet. v. 19, 5 (*Dox.* p. 431). Cf. *Eth. Eud.* H, 1. 1235 a 11.
[4] Arist. *de Respir.* 14. 477 a 32; Theophr. *de causis plant.* i. 21.

Empedokles paid great attention to the subject of respiration, and his very ingenious explanation of it has been preserved in a continuous form (fr. 100). We breathe, he held, through all the pores of the skin, not merely through the organs of respiration. The cause of the alternate inspiration and expiration of the breath was the movement of the blood from the heart to the surface of the body and back again, which was explained by the *klepsydra*.

The nutrition and growth of animals is, of course, to be explained from the attraction of like to like. Each part of the body has pores into which the appropriate food will fit. Pleasure and pain were derived from the absence or presence of like elements, that is, of nourishment which would fit the pores. Tears and sweat arose from a disturbance which curdled the blood; they were, so to say, the whey of the blood.[1]

Perception. 118. For the theory of perception held by Empedokles we have the original words of Theophrastos:—

> Empedokles speaks in the same way of all the senses, and says that perception is due to the "effluences" fitting into the passages of each sense. And that is why one cannot judge the objects of another; for the passages of some of them are too wide and those of others too narrow for the sensible object, so that the latter either goes through without touching or cannot enter at all. R. P. 177 b.
>
> He tries, too, to explain the nature of sight. He says that the interior of the eye consists of fire, while round about it is earth and air,[2] through which its rarity enables the fire to pass like the light in lanterns (fr. 84). The passages of the

[1] Nutrition, Aet. v. 27, 1; pleasure and pain, Aet. iv. 9, 15; v. 28, 1; tears and sweat, v. 22, 1.

[2] That is, watery vapour, not the elemental air or αἰθήρ (§ 107). It is identical with the "water" mentioned below. It is unnecessary, therefore, to insert καὶ ὕδωρ after πῦρ with Karsten and Diels.

fire and water are arranged alternately; through those of the fire we perceive light objects, through those of the water, dark; each class of objects fits into each class of passages, and the colours are carried to the sight by effluence. R. P. *ib.*

But eyes are not all composed in the same way; some are composed of like elements and some of opposite; some have the fire in the centre and some on the outside. That is why some animals are keen-sighted by day and others by night. Those which have less fire are keen-sighted in the daytime, for the fire within is brought up to an equality by that without; those which have less of the opposite (*i.e.* water), by night, for then their deficiency is supplemented. But, in the opposite case, each will behave in the opposite manner. Those eyes in which fire predominates will be dazzled in the daytime, since the fire being still further increased will stop up and occupy the pores of the water. Those in which water predominates will, he says, suffer the same at night, for the fire will be obstructed by the water. And this goes on till the water is separated off by the air, for in each case it is the opposite which is a remedy. The best tempered and the most excellent vision is one composed of both in equal proportions. This is practically what he says about sight.

Hearing, he holds, is produced by sound outside, when the air moved by the voice sounds inside the ear; for the sense of hearing is a sort of bell sounding inside the ear, which he calls a "fleshy sprout." When the air is set in motion it strikes upon the solid parts and produces a sound.[1] Smell, he holds, arises from respiration, and that is why those smell most keenly whose breath has the most violent motion, and why most smell comes from subtle and light bodies.[2] As to touch and taste, he does not lay down how nor by means of what they arise, except that he gives us an explanation applicable to all, that sensation is produced by adaptation to the pores. Pleasure is produced by what is like in its elements and their mixture; pain, by what is opposite. R. P. *ib.*

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[1] Beare, p. 96, n. 1.

[2] *Ibid.* p. 133.

And he gives a precisely similar account of thought and ignorance. Thought arises from what is like and ignorance from what is unlike, thus implying that thought is the same, or nearly the same, as perception. For after enumerating how we know each thing by means of itself, he adds, "for all things are fashioned and fitted together out of these, and it is by these men think and feel pleasure and pain" (fr. 107). And for this reason we think chiefly with our blood, for in it of all parts of the body all the elements are most completely mingled. R. P. 178.

All, then, in whom the mixture is equal or nearly so, and in whom the elements are neither at too great intervals nor too small or too large, are the wisest and have the most exact perceptions; and those who come next to them are wise in proportion. Those who are in the opposite condition are the most foolish. Those whose elements are separated by intervals and rare are dull and laborious; those in whom they are closely packed and broken into minute particles are impulsive, they attempt many things and finish few because of the rapidity with which their blood moves. Those who have a well-proportioned mixture in some one part of their bodies will be clever in that respect. That is why some are good orators and some good artificers. The latter have a good mixture in their hands, and the former in their tongues, and so with all other special capacities. R. P. *ib.*

Perception, then, is due to the meeting of an element in us with the same element outside. This takes place when the pores of the organ of sense are neither too large nor too small for the "effluences" which all things are constantly giving off (fr. 89). Smell was explained by respiration. The breath drew in along with it the small particles which fit into the pores. From Aetios[1] we learn that Empedokles proved this by the example of people with a cold in their head, who cannot smell, just because they have a difficulty

[1] Aet. iv. 17, 2 (*Dox.* p. 407). Beare, p. 133.

in breathing. We also see from fr. 101 that the scent of dogs was referred to in support of the theory. Empedokles seems to have given no detailed account of smell, and did not refer to touch at all.[1] Hearing was explained by the motion of the air which struck upon the cartilage inside the ear and made it swing and sound like a bell.[2]

The theory of vision[3] is more complicated; and, as Plato adopted most of it, it is of great importance in the history of philosophy. The eye was conceived, as by Alkmaion (§ 96),[4] to be composed of fire and water. Just as in a lantern the flame is protected from the wind by horn (fr. 84), so the fire in the iris is protected from the water which surrounds it in the pupil by membranes with very fine pores, so that, while the fire can pass out, the water cannot get in. Sight is produced by the fire inside the eye going forth to meet the object. This seems strange to us, because we are accustomed to the idea of images being impressed upon the retina. But *looking* at a thing no doubt seemed much more like an action proceeding from the eye than a mere passive state.

He was quite aware, too, that "effluences," as he called them, came from things to the eyes as well; for he defined colours as "effluences from forms (or 'things') fitting into the pores and perceived."[5] It is not quite clear how these two accounts of vision were reconciled, or how far we are entitled to credit Empedokles with the Platonic theory. The statements

[1] Beare, pp. 161-3, 180-81.

[2] *Ibid.* pp. 95 sqq.

[3] *Ibid.* pp. 14 sqq.

[4] Theophr. *de sens.* 26.

[5] The definition is quoted from Gorgias in Plato, *Men.* 76 d 4. All our MSS. have ἀπορροαὶ σχημάτων, but Ven. T has in the margin γρ. χρημάτων, which may well be an old tradition. The Ionic for "things" is χρήματα. See Diels, *Empedokles und Gorgias*, p. 439.

which have been quoted seem to imply something very like it.[1]

Theophrastos tells us that Empedokles made no distinction between thought and perception, a remark already made by Aristotle.[2] The chief seat of perception was the blood, in which the four elements are most evenly mixed, and especially the blood near the heart (fr. 105).[3] This does not, however, exclude the idea that other parts of the body may perceive also; indeed, Empedokles held that all things have their share of thought (fr. 103). But the blood was specially sensitive because of its finer mixture.[4] From this it naturally follows that Empedokles adopted the view, already maintained in the Second Part of the poem of Parmenides (fr. 16), that our knowledge varies with the varying constitution of our bodies (fr. 106). This consideration became very important later on as one of the foundations of scepticism; but Empedokles himself only drew from it the conclusion that we must make the best use we can of our senses, and check one by the other (fr. 4).

Theology and religion.

119. The theoretical theology of Empedokles reminds us of Xenophanes, his practical religious teaching of Pythagoras and the Orphics. We are told in the earlier part of the poem that certain "gods" are composed of the elements; and that therefore though

[1] See Beare, *Elementary Cognition*, p. 18.

[2] Arist. *de An.* Γ, 3. 427 a 21.

[3] R. P. 178 a. This was the characteristic doctrine of the Sicilian school, from whom it passed to Aristotle and the Stoics. Plato and Hippokrates, on the other hand, adopted the view of Alkmaion (§ 97) that the brain was the seat of consciousness. Kritias (Arist. *de An.* A, 2. 405 b 6) probably got the Sicilian doctrine from Gorgias. At a later date, Philistion of Syracuse, Plato's friend, substituted the ψυχικὸν πνεῦμα ("animal spirits") which circulated along with the blood.

[4] Beare, p. 253.

they "live long lives" they must pass away (fr. 21). We have seen that the elements and the Sphere are also called gods, but that is in quite another sense of the word.

If we turn to the religious teaching of the *Purifications*, we find that everything turns on the doctrine of transmigration. On the general significance of this enough has been said above (§ 42); the details given by Empedokles are peculiar. According to a decree of Necessity, "daemons" who have sinned are forced to wander from their home in heaven for three times ten thousand seasons (fr. 115). He himself is such an exiled divinity, and has fallen from his high estate because he put his trust in raving Strife. The four elements toss him from one to the other with loathing; and so he has not only been a human being and a plant, but even a fish. The only way to purify oneself from the taint of original sin was by the cultivation of ceremonial holiness, by purifications, and abstinence from animal flesh. For the animals are our kinsmen (fr. 137), and it is parricide to lay hands on them. In all this there are, no doubt, certain points of contact with the cosmology. We have the "mighty oath" (fr. 115; cf. fr. 30), the four elements, Hate as the source of original sin, and Kypris as queen in the Golden Age (fr. 128). But these points are neither fundamental nor of great importance. And it cannot be denied that there are really contradictions between the two poems. That, however, is just what we should expect to find. All through this period, there seems to have been a gulf between men's religious beliefs, if they had any, and their cosmological views. The few points of contact which we have mentioned may have been sufficient to hide this from Empedokles himself.

CHAPTER VI

ANAXAGORAS OF KLAZOMENAI

Date. 120. ALL that Apollodoros tells us with regard to the date of Anaxagoras seems to rest upon the authority of Demetrios Phalereus, who said of him, in the *Register of Archons*, that he began to study philosophy, at the age of twenty, in the archonship of Kallias or Kalliades at Athens (480-79 B.C.).[1] This date was probably derived from a calculation based upon the philosopher's age at the time of his trial, which Demetrios had every opportunity of learning from sources no longer extant. Apollodoros inferred that Anaxagoras was born in Ol. LXX. (500-496 B.C.), and he adds that he died at the age of seventy-two in Ol. LXXXVIII. 1 (428-27 B.C.).[2] He doubtless thought it natural that he should not survive Perikles, and still more natural that he should die the year Plato was born.[3] We have a further statement, of doubtful origin, but probably due to Demetrios also, that Anaxagoras lived at Athens for thirty years. This

[1] Diog. ii. 7 (R. P. 148), with the perfectly certain emendation referred to *ib.* 148 c. The Athens of 480 B.C. would hardly be a suitable place to "begin philosophising"! For the variation in the archon's name, see Jacoby, p. 244, n. 1.

[2] We must read ὀγδοηκοστῆς with Meursius to make the figures come right.

[3] On the statements of Apollodoros, see Jacoby, pp. 244 sqq.

may be a genuine tradition;[1] and if so, we get from about 462 to 432 B.C. as the time he lived there.

There can be no doubt that these dates are very nearly right. Aristotle tells us[2] that Anaxagoras was older than Empedokles, who was born about 490 B.C. (§ 98); and Theophrastos said[3] that Empedokles was born "not long after Anaxagoras." Demokritos, too, said that he himself was a young man in the old age of Anaxagoras, and he must have been born about 460 B.C.[4]

121. Anaxagoras was born at Klazomenai, and Theophrastos tells us that his father's name was Hegesiboulos.[5] The names of both father and son have an aristocratic sound, and we may assume they belonged to a family which had won distinction in the State. Nor need we reject the tradition that Anaxagoras neglected his possessions to follow science.[6] It is certain, at any rate, that in the fourth century he was already regarded as the type of the man who leads the "theoretic life."[7] Of course the story of his contempt for worldly goods was seized on later Early life.

[1] Diog., *loc. cit.* In any case, it is not a mere calculation of Apollodoros's; for he would certainly have made Anaxagoras forty years old at the date of his arrival in Athens, and this would give *at most* twenty-eight years for his residence there. The trial cannot have been later than 432 B.C., and may have been earlier.

[2] Arist. *Met.* A, 3. 984 a 11 (R. P. 150 a).

[3] *Phys. Op.* fr. 3 (*Dox.* p. 477), *ap.* Simpl. *Phys.* p. 25, 19 (R. P. 162 e).

[4] Diog. ix. 41 (R. P. 187). On the date of Demokritos, see Chap. IX. § 171.

[5] *Phys. Op.* fr. 4 (*Dox.* p. 478), repeated by the doxographers.

[6] Plato, *Hipp. ma.* 283 a, τοὐναντίον γὰρ Ἀναξαγόρᾳ φασὶ συμβῆναι ἢ ὑμῖν· καταλειφθέντων γὰρ αὐτῷ πολλῶν χρημάτων καταμελῆσαι καὶ ἀπολέσαι πάντα· οὕτως αὐτὸν ἀνόητα σοφίζεσθαι. Cf. Plut. *Per.* 16.

[7] Arist. *Eth. Nic.* K, 9. 1179 a 13. Cf. *Eth. Eud.* A, 4. 1215 b 6 and 15, 1216 a 10.

by the historical novelist and tricked out with the usual apophthegms. These do not concern us here.

One incident belonging to the early manhood of Anaxagoras is recorded, namely, his observation of the huge meteoric stone which fell into the Aigospotamos in 468-67 B.C.[1] Our authorities tell us that he predicted this phenomenon, which is plainly absurd. But we shall see reason to believe that it may have occasioned one of his most striking departures from the earlier cosmology, and led to his adoption of the very view for which he was condemned at Athens. At all events, the fall of the stone made a profound impression at the time, and it was still shown to tourists in the days of Pliny and Plutarch.[2]

Relation to the Ionic school.

122. The doxographers speak of Anaxagoras as the pupil of Anaximenes.[3] This is, of course, out of the question; Anaximenes most probably died before Anaxagoras was born. But it is not enough to say that the statement arose from the fact that the name of Anaxagoras followed that of Anaximenes in the *Successions*. That is true, no doubt; but it is not the whole truth. We have its original source in a fragment of Theophrastos himself, which states that Anaxagoras had been "an associate of the philosophy of Anaxi-

[1] Diog. ii. 10 (R. P. 149 a). Pliny, *N.H.* ii. 149, gives the date as Ol. LXXVIII. 2; and Eusebios gives it under Ol. LXXVIII. 3. But cf. *Marm. Par.* 57, *ἀφ' οὗ ἐν Αἰγὸς ποταμοῖς ὁ λίθος ἔπεσε . . . ἔτη* ΗΗΙΙ, *ἄρχοντος* 'Αθήνησι Θεαγενίδου, which is 468-67 B.C. The text of Diog. ii. 11 is corrupt. For suggested restorations, see Jacoby, p. 244, n. 2; and Diels, *Vors.* p. 294, 28.

[2] Pliny, *loc. cit.*, "qui lapis etiam nunc ostenditur magnitudine vehis colore adusto." Cf. Plut. *Lys.* 12, *καὶ δείκνυται . . . ἔτι νῦν.*

[3] Cicero, *de nat. D.* i. 26 (after Philodemos), "Anaxagoras qui accepit ab Anaximene disciplinam (*i.e. διήκουσε*); Diog. i. 13 (R. P. 4) and ii. 6; Strabo, xiv. p. 645, Κλαζομένιος *δ' ἦν ἀνὴρ ἐπιφανὴς 'Αναξαγόρας ὁ φυσικός, 'Αναξιμένους ὁμιλητής*; Euseb. *P.E.* p. 504; [Galen] *Hist. Phil.* 3; Augustine, *de Civ. Dei*, viii. 2.

menes."[1] Now this expression has a very distinct meaning if we accept the view as to "schools" of science set forth in the Introduction (§ XIV.). It means that the old Ionic school survived the destruction of Miletos in 494 B.C., and continued to flourish in the other cities of Asia. It means, further, that it produced no man of distinction after its third great representative, and that "the philosophy of Anaximenes" was still taught by whoever was now at the head of the society.

At this point, it may be well to indicate briefly the conclusions to which we shall come in the next few chapters with regard to the development of philosophy during the first half of the fifth century B.C. We shall find that, while the old Ionic school was still capable of training great men, it was now powerless to keep them. Anaxagoras went his own way; Melissos and Leukippos, though they still retained enough of the old views to bear witness to the source of their inspiration, were too strongly influenced by the Eleatic dialectic to remain content with the theories of Anaximenes. It was left to second-rate minds like Diogenes to champion the orthodox system, while third-rate minds like Hippon of Samos even went back to the cruder theory of Thales. The details of this anticipatory sketch will become clearer as we go on; for the present, it is only necessary to call the reader's attention to the fact that the old Ionic Philosophy now forms a sort of background to our story,

[1] *Phys. Op.* fr. 4 (*Dox.* p. 478), Ἀναξαγόρας μὲν γὰρ Ἡγησιβούλου Κλαζομένιος κοινωνήσας τῆς Ἀναξιμένους φιλοσοφίας κ.τ.λ. In his fifth edition (p. 973, n. 2) Zeller adopts the view given in the text, and confirms it by comparing the very similar statement as to Leukippos, κοινωνήσας Παρμενίδῃ τῆς φιλοσοφίας. See below, Chap. IX. § 172.

just as Orphic and Pythagorean religious ideas have done in the preceding chapters.

Anaxagoras at Athens.

123. Anaxagoras was the first philosopher to take up his abode at Athens. We are not to suppose, however, that he was attracted thither by anything in the character of the Athenians. No doubt Athens had now become the political centre of the Hellenic world; but it had not yet produced a single scientific man. On the contrary, the temper of the citizen body was and remained hostile to free inquiry of any kind. Sokrates, Anaxagoras, and Aristotle fell victims in different degrees to the bigotry of the democracy, though, of course, their offence was political rather than religious. They were condemned not as heretics, but as innovators in the *state* religion. Still, as a recent historian observes, "Athens in its flourishing period was far from being a place for free inquiry to thrive unchecked."[1] It is this, no doubt, that has been in the minds of those writers who have represented philosophy as something un-Greek. It was in reality thoroughly Greek, though it was thoroughly un-Athenian.

It seems most reasonable to suppose that Perikles himself brought Anaxagoras to Athens, just as he brought everything else he could. Holm has shown with much skill how the aim of that great statesman was, so to say, to Ionise his fellow-citizens, to impart to them something of the flexibility and openness of mind which characterised their kinsmen across the sea. It is possible that it was Aspasia of Miletos who introduced the Ionian philosopher to the Periklean

[1] Holm, *Gr. Gesch.* ii. 334. The whole chapter is well worth reading in this connexion.

circle, of which he was henceforth a chief ornament. The Athenians in derision gave him the nickname of Nous.[1]

The close relation in which Anaxagoras stood to Perikles is placed beyond the reach of doubt by the testimony of Plato. In the *Phaedrus*[2] he makes Sokrates say: "For all arts that are great, there is need of talk and discussion on the parts of natural science that deal with things on high; for that seems to be the source which inspires high-mindedness and effectiveness in every direction. Perikles added this very acquirement to his original gifts. He fell in, it seems, with Anaxagoras, who was a scientific man; and, satiating himself with the theory of things on high, and having attained to a knowledge of the true nature of intellect and folly, which were just what the discourses of Anaxagoras were mainly about, he drew from that source whatever was of a nature to further him in the art of speech."

A more difficult question is the alleged relation of Euripides to Anaxagoras. The oldest authority for it is Alexander of Aitolia, poet and librarian, who lived at the court of Ptolemy Philadelphos (*c.* 280 B.C.). He referred to Euripides as the "nursling of brave Anaxagoras."[3] A great deal of ingenuity has been expended in trying to find the system of Anaxagoras in the choruses of Euripides; but, it must now be admitted, without result.[4] The famous fragment on

[1] Plut. *Per.* 4 (R. P. 148 c). I follow Zeller, p. 975, n. 1 (Eng. trans. ii. p. 327, n. 4), in regarding the sobriquet as derisive.

[2] 270 a (R. P. 148 c).

[3] Gell. xv. 20, "Alexander autem Aetolus hos de Euripide versus composuit"; ὁ δ' Ἀναξαγόρου τρόφιμος χαιοῦ (so Valckenaer for ἀρχαίου) κ.τ.λ.

[4] The question was first raised by Valckenaer (*Diatribe*, p. 26). Cf. also Wilamowitz, *Analecta Euripidea*, pp. 162 sqq.

the blessedness of the scientific life might just as well refer to any other cosmologist as to Anaxagoras, and indeed suggests more naturally a thinker of a more primitive type.[1] On the other hand, there is one fragment which distinctly expounds the central thought of Anaxagoras, and could hardly be referred to any one else.[2] We may conclude, then, that Euripides knew the philosopher and his views, but it is not safe to go further.

The trial. 124. Shortly before the outbreak of the Peloponnesian War, the enemies of Perikles began a series of attacks upon him through his friends.[3] Pheidias was the first to suffer, and Anaxagoras was the next. That he was an object of special hatred to the religious party need not surprise us, even though the charge made against him does not suggest that he went out of his way to hurt their susceptibilities. The details of the trial are somewhat obscure, but we can make out a few points. The first step taken was the introduction of a psephism by Diopeithes—the same whom Aristophanes laughs at in *The Birds*[4]—enacting that an impeachment should be brought against those who did not practise religion, and taught theories about "the things on high."[5] What happened at the actual trial is very differently related. Our authorities give

[1] See Introd. p. 12, n. 1. The fragment is quoted R. P. 148 c. The words ἀθανάτου φύσεως and κόσμον ἀγήρω carry us back rather to the older Milesians.

[2] R. P. 150 b.

[3] Both Ephoros (represented by Diod. xii. 38) and the source of Plut. *Per.* 32 made these attacks immediately precede the war. This may, however, be pragmatic; they perhaps occurred earlier.

[4] *Birds*, 988. Aristophanes had no respect for orthodoxy when combined with democratic opinions.

[5] Plut. *Per.* 32 (R. P. 148), where some of the original words have been preserved. The phrase τὰ θεῖα and the word μετάρσια are archaisms from the ψήφισμα.

hopelessly conflicting accounts.[1] It is no use attempting to reconcile these; it is enough to insist upon what is certain. Now we know from Plato what the accusation was.[2] It was that Anaxagoras taught the sun was a red-hot stone, and the moon earth; and we shall see that he certainly did hold these views (§ 133). For the rest, the most plausible account is that he was got out of prison and sent away by Perikles.[3] We know that such things were possible at Athens.

Driven from his adopted home, Anaxagoras naturally went back to Ionia, where at least he would be free to teach what he pleased. He settled at Lampsakos, and we shall see reason to believe that he founded a school there.[4] Probably he did not live long after his exile. The Lampsakenes erected an altar to his memory in their market-place, dedicated to Mind and Truth; and the anniversary of his death was long kept as a holiday for school-children, it was said at his own request.[5]

[1] These accounts are repeated by Diog. ii. 12-14. It is worth while to put the statements of Satyros and Sotion side by side in order to show the unsatisfactory character of the biographical tradition:—

	Sotion.	*Satyros.*
Accuser.	Kleon.	Thoukydides s. of Melesias.
Charge.	Calling the sun a red-hot mass.	Impiety and Medism.
Sentence.	Fined five talents.	Sentenced to death in absence.

Hermippos represents Anaxagoras as already in prison under sentence of death when Perikles shamed the people into letting him off. Lastly, Hieronymos says he never was condemned at all. Perikles brought him into court thin and wasted by disease, and the judges acquitted him out of compassion! The Medism alleged by Satyros no doubt comes from Stesimbrotos, who made Anaxagoras the friend of Themistokles instead of Perikles. This, too, explains the accuser's name (Busolt, *Gr. Gesch.* p. 306, n. 3).

[2] *Apol.* 26 d.

[3] Plut. *Nic.* 23 (R. P. 148 c). Cf. *Per.* 32 (R. P. 148).

[4] See the account of Archelaos in Chap. X. § 191.

[5] The oldest authority for the honours paid to Anaxagoras is Alkidamas,

Writings. 125. Diogenes includes Anaxagoras in his list of philosophers who left only a single book, and he has also preserved the accepted criticism of it, namely, that it was written "in a lofty and agreeable style."[1] There is no evidence of any weight to set against this testimony, which comes ultimately from the librarians of Alexandria.[2] The story that Anaxagoras wrote a treatise on perspective as applied to scene-painting is most improbable;[3] and the statement that he composed a mathematical work dealing with the quadrature of the circle is due to misunderstanding of an expression in Plutarch.[4] We learn from the passage in the *Apology*, referred to above, that the works of Anaxagoras could be bought at Athens for a single drachma; and that the book was of some length may be gathered from the way in which Plato goes on to speak of it.[5] In the sixth century A.D. Simplicius had access to a copy, doubtless in the library of the Academy;[6] and it is to him we owe the preservation of all our fragments, with one or two very doubtful

the pupil of Gorgias, who said these were still kept up in his own time. Arist. *Rhet.* B, 23. 1398 b 15.

[1] Diog. i. 16; ii. 6 (R. P. 5; 153).

[2] Schaubach (*An. Claz. Fragm.* p. 57) fabricated a work entitled τὸ πρὸς Λεχῖνεον out of the pseudo-Aristotelian *de plantis*, 817 a 27. But the Latin version of Alfred, which is the original of the Greek, has simply *et ideo dicit lechineon*; and this appears to be due to a failure to make out the Arabic text from which the Latin version was derived. Cf. Meyer, *Gesch. d. Bot.* i. 60.

[3] It comes from Vitruvius, vii. pr. 11. A forger, seeking to decorate his production with a great name, would think naturally of the philosopher who was said to have taught Euripides.

[4] Plut. *de Exilio*, 607 f. The words merely mean that he used to draw mathematical figures relating to the quadrature of the circle on the prison floor.

[5] *Apol.* 26 d-e. The expression βιβλία perhaps implies that it filled more than one roll.

[6] Simplicius also speaks of βιβλία.

exceptions. Unfortunately his quotations seem to be confined to the First Book, that dealing with general principles, so that we are left somewhat in the dark with regard to the treatment of details. This is the more unfortunate, as it was Anaxagoras who first gave the true theory of the moon's light and, therefore, the true theory of eclipses.

126. I give the fragments according to the text and arrangement of Diels, who has made some of them completely intelligible for the first time. The Fragments

(1) All things were together infinite both in number and in smallness; for the small too was infinite. And, when all things were together, none of them could be distinguished for their smallness. For air and aether prevailed over all things, being both of them infinite; for amongst all things these are the greatest both in quantity and size.[1] R. P. 151.

(2) For air and aether are separated off from the mass that surrounds the world, and the surrounding mass is infinite in quantity. R. P. *ib.*

(3) Nor is there a least of what is small, but there is always a smaller; for it cannot be that what is should cease to be by being cut.[2] But there is also always something greater than what is great, and it is equal to the small in amount, and, compared with itself, each thing is both great and small. R. P. 159 a.

(4) And since these things are so, we must suppose that there are contained many things and of all sorts in the things that are uniting, seeds of all things, with all sorts of shapes and colours and savours (R. P. *ib.*), and that men have been formed in them, and the other animals that have life, and that these men have inhabited cities and cultivated fields as

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[1] Simplicius tells us that this fragment was at the beginning of Book I. The familiar sentence quoted by Diog. ii. 6 (R. P. 153) is not a fragment of Anaxagoras, but a summary, like the *πάντα ῥεῖ* ascribed to Herakleitos (Chap. III. p. 162).

[2] Zeller's *τομῇ* still seems to me a convincing correction of the MS. *τὸ μή*, which Diels retains.

with us; and that they have a sun and a moon and the rest as with us; and that their earth brings forth for them many things of all kinds of which they gather the best together into their dwellings, and use them (R. P. 160 b). Thus much have I said with regard to separating off, to show that it will not be only with us that things are separated off, but elsewhere too.

But before they were separated off, when all things were together, not even was any colour distinguishable; for the mixture of all things prevented it—of the moist and the dry, and the warm and the cold, and the light and the dark, and of much earth that was in it, and of a multitude of innumerable seeds in no way like each other. For none of the other things either is like any other. And these things being so, we must hold that all things are in the whole. R. P. 151.[1]

(5) And those things having been thus decided, we must know that all of them are neither more nor less; for it is not possible for them to be more than all, and all are always equal. R. P. 151.

(6) And since the portions of the great and of the small are equal in amount, for this reason, too, all things will be in everything; nor is it possible for them to be apart, but all things have a portion of everything. Since it is impossible for there to be a least thing, they cannot be separated, nor come to be by themselves; but they must be now, just as they were in the beginning, all together. And in all things many things are contained, and an equal number both in the greater and in the smaller of the things that are separated off.

(7) . . . So that we cannot know the number of the things that are separated off, either in word or deed.

(8) The things that are in one world are not divided nor cut off from one another with a hatchet, neither the warm from the cold nor the cold from the warm. R. P. 155 e.

(9) . . . as these things revolve and are separated out by the force and swiftness. And the swiftness makes the force. Their swiftness is not like the swiftness of any of the things

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[1] I had already pointed out in the first edition that Simplicius quotes this three times as a continuous fragment, and that we are not entitled to break it up. Diels now prints it as a single passage.

that are now among men, but in every way many times as swift.

(10) How can hair come from what is not hair, or flesh from what is not flesh? R. P. 155 f, n. 1.

(11) In everything there is a portion of everything except Nous, and there are some things in which there is Nous also. R. P. 160 b.

(12) All other things partake in a portion of everything, while Nous is infinite and self-ruled, and is mixed with nothing, but is alone, itself by itself. For if it were not by itself, but were mixed with anything else, it would partake in all things if it were mixed with any; for in everything there is a portion of everything, as has been said by me in what goes before, and the things mixed with it would hinder it, so that it would have power over nothing in the same way that it has now being alone by itself. For it is the thinnest of all things and the purest, and it has all knowledge about everything and the greatest strength; and Nous has power over all things, both greater and smaller, that have life. And Nous had power over the whole revolution, so that it began to revolve in the beginning. And it began to revolve first from a small beginning; but the revolution now extends over a larger space, and will extend over a larger still. And all the things that are mingled together and separated off and distinguished are all known by Nous. And Nous set in order all things that were to be, and all things that were and are not now and that are, and this revolution in which now revolve the stars and the sun and the moon, and the air and the aether that are separated off. And this revolution caused the separating off, and the rare is separated off from the dense, the warm from the cold, the light from the dark, and the dry from the moist. And there are many portions in many things. But no thing is altogether separated off nor distinguished from anything else except Nous. And all Nous is alike, both the greater and the smaller; while nothing else is like anything else, but each single thing is and was most manifestly those things of which it has most in it. R. P. 155.

(13) And when Nous began to move things, separating off took place from all that was moved, and so far as Nous set in motion all was separated. And as things were set in motion

and separated, the revolution caused them to be separated much more.

(14) And Nous, which ever is, is certainly there, where everything else is, in the surrounding mass, and in what has been united with it and separated off from it.[1]

(15) The dense and the moist and the cold and the dark came together where the earth is now, while the rare and the warm and the dry (and the bright) went out towards the further part of the aether.[2] R. P. 156.

(16) From these as they are separated off earth is solidified; for from mists water is separated off, and from water earth. From the earth stones are solidified by the cold, and these rush outwards more than water. R. P. 156.

(17) The Hellenes follow a wrong usage in speaking of coming into being and passing away; for nothing comes into being or passes away, but there is mingling and separation of things that are. So they would be right to call coming into being mixture, and passing away separation. R. P. 150.

(18) It is the sun that puts brightness into the moon.

(19) We call rainbow the reflexion of the sun in the clouds. Now it is a sign of storm; for the water that flows round the cloud causes wind or pours down in rain.

(20) With the rise of the Dogstar men begin the harvest; with its setting they begin to till the fields. It is hidden for forty days and nights.

(21) From the weakness of our senses we are not able to judge the truth.

(21*a*) What appears is a vision of the unseen.

(21*b*) (We can make use of the lower animals) because we use our own experience and memory and wisdom and art.

(22) What is called "birds' milk" is the white of the egg.

Anaxagoras and his predecessors.

127. The system of Anaxagoras, like that of Empedokles, aimed at reconciling the Eleatic doctrine that corporeal substance is unchangeable with the

[1] Simplicius gives fr. 14 thus (p. 157, 5): *ὁ δὲ νοῦς ὅσα ἐστί τε κάρτα καὶ νῦν ἐστιν.* Diels now reads *ὁ δὲ νοῦς, ὃς ἀ<εί> ἐστι, τὸ κάρτα καὶ νῦν ἐστιν.* The correspondence of *ἀεὶ . . . καὶ νῦν* is strongly in favour of this.

[2] On the text of fr. 15, see R. P. 156 a. I have followed Schorn in adding *καὶ τὸ λαμπρόν* from Hippolytos.

existence of a world which everywhere presents the appearance of coming into being and passing away. The conclusions of Parmenides are frankly accepted and restated. Nothing can be added to all things; for there cannot be more than all, and all is always equal (fr. 5). Nor can anything pass away. What men commonly call coming into being and passing away is really mixture and separation (fr. 17).

This last fragment reads almost like a prose paraphrase of Empedokles (fr. 9); and it is in every way probable that Anaxagoras derived his theory of mixture from his younger contemporary, whose poem was most likely published before his own treatise.[1] We have seen how Empedokles sought to save the world of appearance by maintaining that the opposites—hot and cold, moist and dry—were *things*, each one of which was real in the Parmenidean sense. Anaxagoras regarded this as inadequate. Everything changes into everything else,[2] the things of which the world is made are not "cut off with a hatchet" (fr. 8) in this way. On the contrary, the true formula must be: *There is a portion of everything in everything* (fr. 11).

"Everything in everything."

128. A part of the argument by which Anaxagoras sought to prove this point has been preserved in a corrupt form by Aetios, and Diels has recovered some of the original words from the scholiast on St. Gregory Nazianzene. "We use a simple nourishment," he said, "when we eat the fruit of Demeter or drink water. But how can hair be made of what is not hair, or flesh of

[1] This is doubtless the meaning of the words τοῖς ἔργοις ὕστερος in Arist. *Met.* A, 3. 984 a 12 (R. P. 150 a); though ἔργα certainly does not mean "writings" or *opera omnia*, but simply "achievements." The other possible interpretations are "more advanced in his views" and "inferior in his teaching" (Zeller, p. 1023, n. 2).

[2] Arist. *Phys.* A, 4. 187 b 1 (R. P. 155 a).

what is not flesh?" (fr. 10).[1] That is just the sort of question the early Milesians must have asked, only the physiological interest has now definitely replaced the meteorological. We shall find a similar train of reasoning in Diogenes of Apollonia (fr. 2).

The statement that there is a portion of everything in everything, is not to be understood as referring simply to the original mixture of things before the formation of the worlds (fr. 1). On the contrary, even now "all things are together," and everything, however small and however great, has an equal number of "portions" (fr. 6). A smaller particle of matter could only contain a smaller number of portions, if one of those portions ceased to be; but if anything *is*, in the full Parmenidean sense, it is impossible that mere division should make it cease to be (fr. 3). Matter is infinitely divisible; for there is no least thing, any more than there is a greatest. But however great or small a body may be, it contains just the same number of "portions," that is, a portion of everything.

The portions.

129. What are these "things" of which everything contains a portion? It once was usual to represent the theory of Anaxagoras as if he had said that wheat, for instance, contained small particles of flesh, blood, bones, and the like; but we have just seen that matter is infinitely divisible (fr. 3), and that there are as many "portions" in the smallest particle as in the greatest (fr. 6). This is fatal to the old view. If everything were made up of minute particles of everything else, we could certainly arrive at a point where everything was "unmixed," if only we carried division far enough.

[1] Aet. i. 3, 5 (*Dox.* p. 279). See R. P. 155 f and n. 1. I read καρπὸν with Usener.

This difficulty can only be solved in one way.[1] In fr. 8 the examples given of things which are not "cut off from one another with a hatchet" are the hot and the cold; and elsewhere (frs. 4, 15), mention is made of the other traditional "opposites." Aristotle says that, if we suppose the first principles to be infinite, they may either be one in kind, as with Demokritos, or opposite.[2] Simplicius, following Porphyry and Themistios, refers the latter view to Anaxagoras;[3] and Aristotle himself implies that the opposites of Anaxagoras had as much right to be called first principles as the "homoeomeries."[4]

It is of those opposites, then, and not of the different forms of matter, that everything contains a portion. Every particle, however large or however small, contains every one of those opposite qualities. That which is hot is also to a certain extent cold. Even snow, Anaxagoras affirmed, was black;[5] that is, even the white contains a certain portion of the opposite quality. It is enough to indicate the connexion of this with the views of Herakleitos (§ 80).[6]

[1] See Tannery, *Science hellène*, pp. 283 sqq. I still think that Tannery's interpretation is substantially right, though his statement of it requires some modification.

[2] Arist. *Phys.* A, 2. 184 b 21, *ἢ οὕτως ὥσπερ Δημόκριτος, τὸ γένος ἕν, σχήματι δὲ ἢ εἴδει διαφερούσας, ἢ καὶ ἐναντίας.*

[3] *Phys.* p. 44, 1. He goes on to refer to *θερμότητας . . . καὶ ψυχρότητας ξηρότητάς τε καὶ ὑγρότητας μανότητάς τε καὶ πυκνότητας καὶ τὰς ἄλλας κατὰ ποιότητα ἐναντιότητας.* He observes, however, that Alexander rejected this interpretation and took *διαφερούσας ἢ καὶ ἐναντίας* closely together as both referring to Demokritos.

[4] *Phys.* A, 4. 187 a 25, *τὸν μὲν* (*Ἀναξαγόραν*) *ἄπειρα ποιεῖν τά τε ὁμοιομερῆ καὶ τἀναντία.* Aristotle's own theory only differs from this in so far as he makes *ὕλη* prior to the *ἐναντία.*

[5] Sext. *Pyrrh.* i. 33 (R. P. 161 b).

[6] The connexion was already noted by the eclectic Herakleitean to whom I attribute *Περὶ διαίτης*, i. 3-4 (see above, Chap. III. p. 167, n. 2). Cf. the words *ἔχει δὲ ἀπ' ἀλλήλων τὸ μὲν πῦρ ἀπὸ τοῦ ὕδατος τὸ ὑγρόν·*

Seeds. 130. The difference, then, between the theory of Anaxagoras and that of Empedokles is this. Empedokles had taught that, if you divide the various things which make up this world, and in particular the parts of the body, such as flesh, bones, and the like, far enough, you come to the four "roots" or elements, which are, accordingly, the ultimate reality. Anaxagoras held that, however far you may divide any of these things—and they are infinitely divisible—you never come to a part so small that it does not contain portions of all the opposites. The smallest portion of bone is still bone. On the other hand, everything can pass into everything else just because the "seeds," as he called them, of each form of matter contain a portion of everything, that is, of all the opposites, though in different proportions. If we are to use the word "element" at all, it is these seeds that are the elements in the system of Anaxagoras.

Aristotle expresses this by saying that Anaxagoras regards the *ὁμοιομερῆ* as *στοιχεῖα*.[1] We have seen that the term *στοιχεῖον* is of later date than Anaxagoras, and it is natural to suppose that the word *ὁμοιομερῆ* is also only Aristotle's name for the "seeds." In his own system, the *ὁμοιομερῆ* are intermediate between the elements (*στοιχεῖα*), of which they are composed, and

ἔνι γὰρ ἐν πυρὶ ὑγρότης· τὸ δὲ ὕδωρ ἀπὸ τοῦ πυρὸς τὸ ξηρόν· ἔνι γὰρ καὶ ἐν ὕδατι ξηρόν.

[1] Arist. *de Gen. Corr.* A, 1, 314 a 18, *ὁ μὲν γὰρ* (Anaxagoras) *τὰ ὁμοιομερῆ στοιχεῖα τίθησιν, οἷον ὀστοῦν καὶ σάρκα καὶ μυελόν, καὶ τῶν ἄλλων ὧν ἑκάστῳ συνώνυμον τὸ μέρος ἐστίν.* This was, of course, repeated by Theophrastos and the doxographers; but it is to be noted that Aetios, supposing as he does that Anaxagoras himself used the term, gives it an entirely wrong meaning. He says that the *ὁμοιομέρειαι* were so called from the likeness of the particles of the *τροφή* to those of the body (*Dox.* 279 a 21; R. P. 155 f). Lucretius, i. 830 sqq. (R. P. 150 a) has a similar account of the matter, derived from Epicurean sources. Obviously, it cannot be reconciled with what Aristotle says.

the organs (ὄργανα), which are composed of them. The heart cannot be divided into hearts, but the parts of flesh are flesh. That being so, Aristotle's statement is quite intelligible from his own point of view, but there is no reason for supposing that Anaxagoras expressed himself in that particular way. All we are entitled to infer is that he said the "seeds," which he had substituted for the "roots" of Empedokles, were not the opposites in a state of separation, but each contained a portion of them all. If Anaxagoras had used the term "homoeomeries"[1] himself, it would be strange that Simplicius should quote no fragment containing it.

The difference between the two systems may also be regarded from another point of view. Anaxagoras was not obliged by his theory to regard the elements of Empedokles as primary, a view to which there were obvious objections, especially in the case of earth. He explained them in quite another way. Though everything has a portion of everything in it, things appear to be that of which there is most in them (fr. 12 *sub fin.*). We may say, then, that Air is that in which there is most cold, Fire that in which there is most heat, and so on, without giving up the view that there is a portion of cold in the fire and a portion of heat in the air.[2] The great masses which Empedokles had taken for elements are really vast collections of all manner of "seeds." Each of them is, in fact, a πανσπερμία.[3]

[1] It is more likely that we have a trace of the terminology of Anaxagoras himself in Περὶ διαίτης, 3, μέρεα μερέων, ὅλα ὅλων.

[2] Cf. above, p. 305.

[3] Arist. *de Gen. Corr.* A, 1. 314 a 29. The word πανσπερμία was used by Demokritos (Arist. *de An.* 404 a 8; R. P. 200), and it occurs in the Περὶ διαίτης (*loc. cit.*). It seems natural to suppose that it was used by Anaxagoras himself, as he used the term σπέρματα. Much difficulty has been caused by the apparent inclusion of Water and Fire among the

"All things together."

131. From all this it follows that, when "all things were together," and when the different seeds of things were mixed together in infinitely small particles (fr. 1), the appearance presented would be that of one of what had hitherto been regarded as the primary substances. As a matter of fact, they did present the appearance of "air and aether"; for the qualities (things) which belong to these prevail in quantity over all other things in the universe, and everything is most obviously that of which it has most in it (fr. 12 *sub fin.*). Here, then, Anaxagoras attaches himself to Anaximenes. The primary condition of things, before the formation of the worlds, is much the same in both; only, with Anaxagoras, the original mass is no longer the primary substance, but a mixture of innumerable seeds divided into infinitely small parts.

This mass is infinite, like the air of Anaximenes, and it supports itself, since there is nothing surrounding it.[1] Further, the "seeds" of all things which it contains are infinite in number (fr. 1). But, as the innumerable seeds may be divided into those in which the portions of cold, moist, dense, and dark prevail, and those which have most of the warm, dry, rare, and light in them, we may say that the original mass was a mixture of infinite Air and of infinite Fire. The seeds of Air, of course, contain "portions" of the

ὁμοιομερῆ in Arist. *Met.* A, 3. 984 a 11 (R. P. 150 a). Bonitz understands the words καθάπερ ὕδωρ ἢ πῦρ to mean "as we have just seen that Fire and Water do in the system of Empedokles." In any case, καθάπερ goes closely with οὕτω, and the general sense is that Anaxagoras applies to the ὁμοιομερῆ what is really true of the στοιχεῖα. It would be better to delete the comma after πῦρ and add one after φησι, for συγκρίσει καὶ διακρίσει μόνον is explanatory of οὕτω . . . καθάπερ. In the next sentence, I read ἁπλῶς for ἄλλως with Zeller (*Arch.* ii. p. 261). See also Arist. *de Caelo*, Γ, 3. 302 b 1 (R. P. 150 a), where the matter is very clearly put.

[1] Arist. *Phys.* Γ, 5. 205 b 1 (R. P. 154 a).

"things" that predominate in Fire, and *vice versa*; but we regard everything as being that of which it has most in it. Lastly, there is no void in this mixture, an addition to the theory made necessary by the arguments of Parmenides. It is, however, worthy of note that Anaxagoras added an experimental proof of this to the purely dialectical one of the Eleatics. He used the *klepsydra* experiment as Empedokles had done (fr. 100), and also showed the corporeal nature of air by means of inflated skins.[1]

132. Like Empedokles, Anaxagoras required some external cause to produce motion in the mixture. Body, Parmenides had shown, would never move itself, as the Milesians had supposed. Anaxagoras called the cause of motion by the name of Nous. It was this which made Aristotle say that he "stood out like a sober man from the random talkers that had preceded him,"[2] and he has often been credited with the introduction of the spiritual into philosophy. The disappointment expressed both by Plato and Aristotle as to the way in which Anaxagoras worked out the theory should, however, make us pause to reflect before accepting too exalted a view of it. Plato[3] makes Sokrates say: "I once heard a man reading a book, as he said, of Anaxagoras, and saying it was Mind that ordered the world and was the cause of all things. I was delighted to hear of this cause, and I thought he really was right. . . . But my extravagant expectations Nous.

[1] *Phys.* Z, 6. 213 a 22 (R. P. 159). We have a full discussion of the experiments with the *klepsydra* in *Probl.* 914 b 9 sqq., a passage which we have already used to illustrate Empedokles, fr. 100. See above, p. 253, n. 2.

[2] Arist. *Met.* A, 3. 984 b 15 (R. P. 152).

[3] Plato, *Phd.* 97 b 8 (R. P. 155 d).

were all dashed to the ground when I went on and found that the man made no use of Mind at all. He ascribed no causal power whatever to it in the ordering of things, but to airs, and aethers, and waters, and a host of other strange things." Aristotle, probably with this passage in mind, says:[1] "Anaxagoras uses Mind as a *deus ex machina* to account for the formation of the world; and whenever he is at a loss to explain why anything necessarily is, he drags it in. But in other cases he makes anything rather than Mind the cause." These utterances may well suggest that the Nous of Anaxagoras did not really stand on a higher level than the Love and Strife of Empedokles, and this will only be confirmed when we look at what he himself has to say about it.

In the first place, Nous is unmixed (fr. 12), and does not, like other things, contain a portion of everything. This would hardly be worth saying of an immaterial mind; no one would suppose that to be hot or cold. The result of its being unmixed is that it "has power over" everything, that is to say, in the language of Anaxagoras, it causes things to move.[2] Herakleitos had said as much of Fire, and Empedokles of Strife. Further, it is the "thinnest" of all things, so that it can penetrate everywhere, and it would be meaningless to say that the immaterial is "thinner" than the material. It is true that Nous also "knows

[1] Arist. *Met.* A, 4. 985 a 18 (R. P. 155 d).

[2] Arist. *Phys.* Θ, 5. 256 b 24, *διὸ καὶ Ἀναξαγόρας ὀρθῶς λέγει, τὸν νοῦν ἀπαθῆ φάσκων καὶ ἀμιγῆ εἶναι, ἐπειδήπερ κινήσεως ἀρχὴν αὐτὸν ποιεῖ εἶναι· οὕτω γὰρ ἂν μόνως κινοίη ἀκίνητος ὢν καὶ κρατοίη ἀμιγὴς ὤν.* This is only quoted for the meaning of *κρατεῖν*. Of course, the words *ἀκίνητος ὤν* are not meant to be historical, and still less is the interpretation in *de An.* Γ, 4. 429 a 18. Diogenes of Apollonia (fr. 5) couples *ὑπὸ τούτου πάντα κυβερνᾶσθαι* (the old Milesian word) with *πάντων κρατεῖν*.

all things"; but so, perhaps, did the Fire of Herakleitos,[1] and certainly the Air of Diogenes.[2] Zeller holds, indeed, that Anaxagoras meant to speak of something incorporeal; but he admits that he did not succeed in doing so,[3] and that is historically the important point. Nous is certainly imagined as occupying space; for we hear of greater and smaller parts of it (fr. 12).

The truth probably is that Anaxagoras substituted Nous for the Love and Strife of Empedokles, because he wished to retain the old Ionic doctrine of a substance that "knows" all things, and to identify this with the new theory of a substance that "moves" all things. Perhaps, too, it was his increased interest in physiological as distinguished from purely cosmological matters that led him to speak of Mind rather than Soul. The former word certainly suggests design more clearly than the latter. But, in any case, the originality of Anaxagoras lies far more in the theory of matter than in that of Nous.

Formation of the worlds.

133. The formation of a world starts with a rotatory motion which Nous imparts to a portion of the mixed mass in which "all things are together" (fr. 13), and this rotatory motion gradually extends over a wider and wider space. Its rapidity (fr. 9) produced a separation of the rare and the dense, the cold and the hot, the dark and the light, the moist and the dry (fr. 15). This separation produces two great masses, the one consisting of the rare, hot, light, and dry, called the "Aether"; the other, in which the opposite qualities predominate, called "Air" (fr. 1).

[1] If we retain the MS. εἰδέναι in fr. 1. In any case, the name τὸ σοφὸν implies as much. [2] See fr. 3, 5. [3] Zeller, p. 993.

Of these the Aether or Fire[1] took the outside while the Air occupied the centre (fr. 15).

The next stage is the separation of the air into clouds, water, earth, and stones (fr. 16). In this Anaxagoras follows Anaximenes closely. In his account of the origin of the heavenly bodies, however, he showed himself more original. We read at the end of fr. 16 that stones "rush outwards more than water," and we learn from the doxographers that the heavenly bodies were explained as stones torn from the earth by the rapidity of its revolution and made red-hot by the speed of their own motion.[2] Perhaps the fall of the meteoric stone at Aigospotamoi had something to do with the origin of this theory. It may also be observed that, while in the earlier stages of the world-formation we are guided chiefly by the analogy of water rotating with light and heavy bodies floating in it, we are here reminded rather of a sling.

Innumerable worlds.

134. That Anaxagoras adopted the ordinary Ionian theory of innumerable worlds is perfectly clear from fr. 4, which we have no right to regard as other than continuous.[3] The words "that it was not only with us that things were separated off, but elsewhere too" can only mean that Nous has caused a rotatory movement in more parts of the boundless mixture than one. Aetios certainly includes Anaxagoras among those who held there was only one world; but this testimony cannot be considered of the same weight as

[1] Note that Anaxagoras says "air" where Empedokles usually said "aether," and that "aether" is with him equivalent to fire. Cf. Arist. *de Caelo*, Γ, 3. 302 b 4, *τὸ γὰρ πῦρ καὶ τὸν αἰθέρα προσαγορεύει ταὐτό*; and *ib.* A, 3. 270 b 24, *Ἀναξαγόρας δὲ καταχρῆται τῷ ὀνόματι τούτῳ οὐ καλῶς· ὀνομάζει γὰρ αἰθέρα ἀντὶ πυρός.*

[2] Aet. ii. 13, 3 (*Dox.* p. 341; R. P. 157 c).

[3] See above, p. 300, n. 1.

that of the fragments.[1] Zeller's reference of the words "elsewhere, as with us" to the moon is very improbable. Is it likely that any one would say that the inhabitants of the moon "have a sun and moon as with us"?[2]

135. The cosmology of Anaxagoras is clearly based upon that of Anaximenes, as will be obvious from a comparison of the following passage of Hippolytos[3] with the quotations given in Chap. I. (§ 29):— **Cosmology.**

(3) The earth is flat in shape, and remains suspended because of its size and because there is no vacuum.[4] For this reason the air is very strong, and supports the earth which is borne up by it.

(4) Of the moisture on the surface of the earth, the sea arose from the waters in the earth (for when these were evaporated the remainder turned salt),[5] and from the rivers which flow into it.

(5) Rivers take their being both from the rains and from the waters in the earth; for the earth is hollow and has waters in its cavities. And the Nile rises in summer owing to the water that comes down from the snows in Ethiopia.[6]

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[1] Aet. ii. 1, 3. See above, Chap. I. p. 63.

[2] Further, it can be proved that this passage (fr. 4) occurred quite near the beginning of the work. Cf. Simpl. *Phys.* p. 34, 28, *μετ' ὀλίγα τῆς ἀρχῆς τοῦ πρώτου Περὶ φυσέως*, p. 156, 1, *καὶ μετ' ὀλίγα* (after fr. 2), which itself occurred, *μετ' ὀλίγον* (after fr. 1), which was the beginning of the book. A reference to other "worlds" would be quite in place here, but not a reference to the moon.

[3] *Ref.* i. 8, 3 (*Dox.* p. 562).

[4] This is an addition to the older view occasioned by the Eleatic denial of the void.

[5] The text here is very corrupt, but the general sense can be got from Aet. iii. 16. 2.

[6] The MS. reading is *ἐν τοῖς ἄρκτοις*, for which Diels adopts Fredrichs' *ἐν τοῖς ἀνταρκτικοῖς*. I have thought it safer to translate the *ἐν τῇ Αἰθιοπίᾳ* which Aetios gives (iv. 1, 3). This view is mentioned and rejected by Herodotos (ii. 22). Seneca (*N. Q.* iv. 2, 17) points out that it was adopted by Aischylos (*Suppl.* 559, fr. 300, Nauck), Sophokles (fr. 797), and Euripides (*Hel.* 3, fr. 228).

(6) The sun and the moon and all the stars are fiery stones carried round by the rotation of the aether. Under the stars are the sun and moon, and also certain bodies which revolve with them, but are invisible to us.

(7) We do not feel the heat of the stars because of the greatness of their distance from the earth; and, further, they are not so warm as the sun, because they occupy a colder region. The moon is below the sun, and nearer us.

(8) The sun surpasses the Peloponnesos in size. The moon has not a light of her own, but gets it from the sun. The course of the stars goes under the earth.

(9) The moon is eclipsed by the earth screening the sun's light from it, and sometimes, too, by the bodies below the moon coming before it. The sun is eclipsed at the new moon, when the moon screens it from us. Both the sun and the moon turn in their courses owing to the repulsion of the air. The moon turns frequently, because it cannot prevail over the cold.

(10) Anaxagoras was the first to determine what concerns the eclipses and the illumination of the sun and moon. And he said the moon was of earth, and had plains and ravines in it. The Milky Way was the reflexion of the light of the stars that were not illuminated by the sun. Shooting stars were sparks, as it were, which leapt out owing to the motion of the heavenly vault.

(11) Winds arose when the air was rarefied by the sun, and when things were burned and made their way to the vault of heaven and were carried off. Thunder and lightning were produced by heat striking upon clouds.

(12) Earthquakes were caused by the air above striking on that beneath the earth; for the movement of the latter caused the earth which floats on it to rock.

All this confirms in the most striking way the statement of Theophrastos, that Anaxagoras had belonged to the school of Anaximenes. The flat earth floating on the air, the dark bodies below the moon, the explanation of the solstices and the "turnings" of the moon by the resistance of air, the explanations given of wind and of

thunder and lightning, are all derived from the earlier inquirer.

136. "There is a portion of everything in everything except Nous, and there are some things in which there is Nous also" (fr. 11). In these words Anaxagoras laid down the distinction between animate and inanimate things. He tells us that it is the same Nous that "has power over," that is, sets in motion, all things that have life, both the greater and the smaller (fr. 12). The Nous in living creatures is the same in all (fr. 12), and from this it followed that the different grades of intelligence which we observe in the animal and vegetable worlds depend entirely on the structure of the body. The Nous was the same, but it had more opportunities in one body than another. Man was the wisest of animals, not because he had a better sort of Nous, but simply because he had hands.[1] This view is quite in accordance with the previous development of thought upon the subject. Parmenides, in the Second Part of his poem (fr. 16), had already made the thought of men depend upon the constitution of their limbs. Biology.

As all Nous is the same, we are not surprised to find that plants were regarded as living creatures. If we may trust the pseudo-Aristotelian *Treatise on Plants*[2] so far, Anaxagoras argued that they must feel pleasure and pain in connexion with their growth and with the fall of their leaves. Plutarch says[3] that he called plants "animals fixed in the earth."

Both plants and animals originated in the first instance from the *πανσπερμία*. Plants first arose when

[1] Arist. *de Part. An.* Δ, 10. 687 a 7 (R. P. 160 b).
[2] [Arist.] *de plant.* A, 1. 815 a 15 (R. P. 160).
[3] Plut. *Q.N.* 1 (R. P. 160), *ζῷον . . . ἐγγεῖον*.

the seeds of them which the air contained were brought down by the rain-water,[1] and animals originated in a similar way.[2] Like Anaximander, Anaxagoras held that animals first arose in the moist element.[3]

Perception. 137. In these scanty notices we seem to see traces of a polemical attitude towards Empedokles, and the same may be observed in what we are told of the theory of perception adopted by Anaxagoras, especially in the view that perception is of contraries.[4] The account which Theophrastos gives of this[5] is as follows:—

But Anaxagoras says that perception is produced by opposites; for like things cannot be affected by like. He attempts to give a detailed enumeration of the particular senses. We see by means of the image in the pupil; but no image is cast upon what is of the same colour, but only on what is different. With most living creatures things are of a different colour to the pupil by day, though with some this is so by night, and these are accordingly keen-sighted at that time. Speaking generally, however, night is more of the same colour with the eyes than day. And an image is cast on the pupil by day, because light is a concomitant cause of the image, and because the prevailing colour casts an image more readily upon its opposite.[6]

It is in the same way that touch and taste discern their objects. That which is just as warm or just as cold as we are neither warms us nor cools us by its contact; and, in the same way, we do not apprehend the sweet and the sour by means of themselves. We know cold by warm, fresh by salt, and sweet by sour, in virtue of our deficiency in each; for all these are in us to begin with. And we smell and hear in the same

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[1] Theophr. *Hist. Plant.* iii. 1, 4 (R. P. 160).
[2] Irenaeus, *adv. Haer.* ii. 14, 2 (R. P. 160 a).
[3] Hipp. *Ref.* i. 8, 12 (*Dox.* p. 563).
[4] Beare, p. 37.
[5] Theophr. *de Sensu*, 27 sqq. (*Dox.* p. 507).
[6] Beare, p. 38.

manner; the former by means of the accompanying respiration, the latter by the sound penetrating to the brain, for the bone which surrounds this is hollow, and it is upon it that the sound falls.[1]

And all sensation implies pain, a view which would seem to be the consequence of the first assumption, for all unlike things produce pain by their contact. And this pain is made perceptible by the long continuance or by the excess of a sensation. Brilliant colours and excessive noises produce pain, and we cannot dwell long on the same things. The larger animals are the more sensitive, and, generally, sensation is proportionate to the size of the organs of sense. Those animals which have large, pure, and bright eyes, see large objects and from a great distance, and contrariwise.[2]

And it is the same with hearing. Large animals can hear great and distant sounds, while less sounds pass unperceived; small animals perceive small sounds and those near at hand.[3] It is the same too with smell. Rarefied air has more smell; for, when air is heated and rarefied, it smells. A large animal when it breathes draws in the condensed air along with the rarefied, while a small one draws in the rarefied by itself; so the large one perceives more. For smell is better perceived when it is near than when it is far by reason of its being more condensed, while when dispersed it is weak. But, roughly speaking, large animals do not perceive a rarefied smell, nor small animals a condensed one.[4]

This theory marks in some respects an advance upon that of Empedokles. It was a happy thought of Anaxagoras to make sensation depend upon irritation by opposites, and to connect it with pain. Many modern theories are based upon a similar idea.

That Anaxagoras regarded the senses as incapable of reaching the truth of things is shown by the fragments preserved by Sextus. But we must not, for all that, turn him into a sceptic. The saying preserved

[1] Beare, p. 208.
[2] *Ibid.* p. 209.
[3] *Ibid.* p. 103.
[4] *Ibid.* p. 137.

by Aristotle[1] that "things are as we suppose them to be," has no value at all as evidence. It comes from some collection of apophthegms, not from the treatise of Anaxagoras himself; and it had, as likely as not, a moral application. He did say (fr. 21) that "the weakness of our senses prevents our discerning the truth," but this meant simply that we do not see the "portions" of everything which are in everything; for instance, the portions of black which are in the white. Our senses simply show us the portions that prevail. He also said that the things which are seen give us the power of seeing the invisible, which is the very opposite of scepticism (fr. 21*a*).

[1] *Met.* Δ, 5. 1009 b 25 (R. P. 161 a).

CHAPTER VII

THE PYTHAGOREANS

138. We have seen (§ 40) how the Pythagoreans, after losing their supremacy at Kroton, concentrated themselves at Rhegion; but the school founded there was soon broken up. Archippos stayed behind in Italy; but Philolaos and Lysis, the latter of whom had escaped as a young man from the massacre of Kroton, betook themselves to continental Hellas, settling finally at Thebes. We know from Plato that Philolaos was there some time during the latter part of the fifth century, and Lysis was afterwards the teacher of Epameinondas.[1] Some of the Pythagoreans, however, were able to return to Italy later on. Philolaos certainly did so, and Plato implies that he had left Thebes some time before 399 B.C., the year in which Sokrates was put to death. In the fourth century, the chief seat of the school is at Taras, and we find the Pythagoreans heading the opposition to Dionysios of Syracuse. It is to this period that Archytas belongs. He was the friend of Plato, and almost realised, if he did not suggest, the ideal of the philosopher king. He ruled Taras for years, and Aris-

The Pythagorean school.

[1] For Philolaos, see Plato, *Phd.* 61 d 7; e 7; and for Lysis, Aristoxenos in Iambl. *V. Pyth.* 250 (R. P. 59 b).

toxenos tells us that he was never defeated in the field of battle.[1] He was also the inventor of mathematical mechanics. At the same time, Pythagoreanism had taken root in Hellas. Lysis, we have seen, remained at Thebes, where Simmias and Kebes had heard Philolaos, and there was an important community of Pythagoreans at Phleious. Aristoxenos was personally acquainted with the last generation of the school, and mentioned by name Xenophilos the Chalkidian from Thrace, with Phanton, Echekrates, Diokles, and Polymnestos of Phleious. They were all, he said, disciples of Philolaos and Eurytos.[2] Plato was on friendly terms with these men, and dedicated the *Phaedo* to them.[3] Xenophilos was the teacher of Aristoxenos, and lived in perfect health at Athens till the age of a hundred and five.[4]

Philolaos.

139. This generation of the school really belongs, however, to a later period, and cannot be profitably studied apart from Plato; it is with their master Philolaos we have now to deal. The facts we know about his teaching from external sources are few in number. The doxographers, indeed, ascribe to him an elaborate theory of the planetary system, but Aristotle never mentions his name in connexion with this. He gives it as the theory of "the Pythagoreans" or of "some Pythagoreans."[5] It seems natural to suppose, however, that the Pythagorean elements of

[1] Diog. viii. 79-83 (R. P. 61). Aristoxenos himself came from Taras. For the political activity of the Tarentine Pythagoreans, see Meyer, *Gesch. des Alterth.* v. § 824. The story of Damon and Phintias (told by Aristoxenos) belongs to this time.

[2] Diog. viii. 46 (R. P. 62).

[3] Compare the way in which the *Theaetetus* is dedicated to the school of Megara.

[4] See Aristoxenos *ap.* Val. Max. viii. 13, ext. 3; and Souidas *s.v.*

[5] See below, §§ 150-152.

Plato's *Phaedo* and *Gorgias* come mainly from Philolaos. Plato makes Sokrates express surprise that Simmias and Kebes had not learnt from him why it is unlawful for a man to take his life,[1] and it seems to be implied that the Pythagoreans at Thebes used the word "philosopher" in the special sense of a man who is seeking to find a way of release from the burden of this life.[2] It is extremely probable that Philolaos spoke of the body (*σῶμα*) as the tomb (*σῆμα*) of the soul.[3] In any case, we seem to be justified in holding that he taught the old Pythagorean religious doctrine in some form, and it is likely that he laid special stress upon knowledge as a means of release. That is the impression we get from Plato, and he is by far the best authority we have on the subject.

We know further that Philolaos wrote on "numbers"; for Speusippos followed him in the

[1] Plato, *Phd.* 61 d 6.

[2] This appears to follow at once from the remark of Simmias in *Phd.* 64 b. The whole passage would be pointless if the words *φιλόσοφος, φιλοσοφεῖν, φιλοσοφία* had not in some way become familiar to the ordinary Theban of the fifth century. Now Herakleides Pontikos made Pythagoras invent the word, and expound it in a conversation with Leon, tyrant of Sikyon *or Phleious.* Cf. Diog. i. 12 (R. P. 3), viii. 8; Cic. *Tusc.* v. 3. 8; Döring in *Arch.* v. pp. 505 sqq. It seems to me that the way in which the term is introduced in the *Phaedo* is fatal to the view that this is a Sokratic idea transferred by Herakleides to the Pythagoreans. Cf. also the remark of Alkidamas quoted by Arist. *Rhet.* B, 23. 1398 b 18, *Θήβησιν ἅμα οἱ προστάται φιλόσοφοι ἐγένοντο καὶ εὐδαιμόνησεν ἡ πόλις.*

[3] For reasons which will appear, I do not attach importance in this connexion to Philolaos, fr. 14 Diels = 23 Mullach (R. P. 89), but it does seem likely that the *μυθολογῶν κομψὸς ἀνήρ* of *Gorg.* 493 a 5 (R. P. 89 b) is responsible for the whole theory there given. He is certainly, in any case, the author of the *τετρημένος πίθος*, which implies the same general view. Now he is called *ἴσως Σικελός τις ἢ Ἰταλικός*, which means he was an Italian; for the *Σικελός τις* is merely an allusion to the *Σικελὸς κομψὸς ἀνὴρ ποτὶ τὰν ματέρ' ἔφα* of Timokreon. We do not know of any Italian from whom Plato could have learnt these views except Philolaos or one of his disciples. They may, however, be originally Orphic for all that (cf. R. P. 89 a).

account he gave of the Pythagorean theories on that subject.[1] It is probable that he busied himself mainly with arithmetic, and we can hardly doubt that his geometry was of the primitive type described in an earlier chapter. Eurytos was his disciple, and we have seen (§ 47) that his views were still very crude.

We also know now that Philolaos wrote on medicine,[2] and that, while apparently influenced by the theories of the Sicilian school, he opposed them from the Pythagorean standpoint. In particular, he said that our bodies were composed only of the warm, and did not participate in the cold. It was only after birth that the cold was introduced by respiration. The connexion of this with the old Pythagorean theory is obvious. Just as the Fire in the macrocosm draws in and limits the cold dark breath which surrounds the world (§ 53), so do our bodies inhale cold breath from outside. Philolaos made bile, blood, and phlegm the causes of disease; and, in accordance with the theory just mentioned, he had to deny that the phlegm was cold, as the Sicilian school held it was. Its etymology proved that it was warm. As Diels says, Philolaos strikes us as an "uninteresting eclectic" so far as his medical views are concerned.[3] We shall see, however, that it was just this preoccupation with the medicine of the Sicilian school that gave rise to some of the most striking developments of later Pythagoreanism.

Plato and the Pythagoreans.

140. Such, so far as we can see, was the historical

[1] See above, Chap. II. p. 113, n. 2.

[2] It is a good illustration of the defective character of our tradition (Introd. § XIII.) that this was quite unknown till the publication of the extracts from Menon's *Iatrika* contained in the Anonymus Londinensis. The extract referring to Philolaos is given and discussed by Diels in *Hermes*, xxviii. pp. 417 sqq.

[3] *Hermes*, *loc. cit.*

Philolaos, and he is a sufficiently remarkable figure. He is usually, however, represented in a different light, and has even been spoken of as a "precursor of Copernicus." To understand this, we shall have to consider for a little the story of what can only be called a literary conspiracy. Not till this has been exposed will it be possible to estimate the real importance of Philolaos and his immediate disciples.

As we can see from the *Phaedo* and the *Gorgias*, Plato was intimate with these men and was deeply impressed by their religious teaching, though it is plain too that he did not adopt it as his own faith. He was still more attracted by the scientific side of Pythagoreanism, and to the last this exercised a great influence on him. His own system in its final form had many points of contact with it, as he is careful to mark in the *Philebus*.[1] But, just because he stood so near it, he is apt to develop Pythagoreanism on lines of his own, which may or may not have commended themselves to Archytas, but are no guide to the views of Philolaos and Eurytos. He is not careful, however, to claim the authorship of his own improvements in the system. He did not believe that cosmology could be an exact science, and he is therefore quite willing to credit Timaios the Lokrian, or "ancient sages" generally, with theories which certainly had their birth in the Academy.

Now Plato had many enemies and detractors, and this literary device enabled them to bring against him the charge of plagiarism. Aristoxenos was one of these enemies, and we know he made the extraordinary statement that most of the *Republic* was to be found in

[1] Plato, *Phileb.* 16 c sqq.

a work by Protagoras.[1] He seems also to be the original source of the story that Plato bought "three Pythagorean books" from Philolaos and copied the *Timaeus* out of them. According to this, the "three books" had come into the possession of Philolaos; and, as he had fallen into great poverty, Dion was able to buy them from him, or from his relatives, at Plato's request, for a hundred *minae*.[2] It is certain, at any rate, that this story was already current in the third century; for the sillographer Timon of Phleious addresses Plato thus: "And of thee too, Plato, did the desire of discipleship lay hold. For many pieces of silver thou didst get in exchange a small book, and starting from it didst learn to write *Timaeus*."[3] Hermippos, the pupil of Kallimachos, said that "some writer" said that Plato himself bought the books from the relatives of Philolaos for forty Alexandrian *minae* and copied the *Timaeus* out of it; while Satyros, the Aristarchean, says he got it through Dion for a hundred *minae*.[4] There is no suggestion in any of these accounts that the book was by Philolaos himself; they imply rather that what Plato bought was either a book by Pythagoras, or at any rate authentic notes of his teaching, which had come into the hands of Philolaos. In later times, it was generally supposed that the work entitled *The Soul of the World*, by Timaios the Lokrian, was meant;[5] but it has now been proved beyond a doubt that this cannot have

[1] Diog. iii. 37. For similar charges, cf. Zeller, *Plato*, p. 429, n. 7.

[2] Iambl. *V. Pyth.* 199. Diels is clearly right in ascribing the story to Aristoxenos (*Arch.* iii. p. 461, n. 26).

[3] Timon *ap.* Gell. iii. 17 (R. P. 60 a).

[4] For Hermippos and Satyros, see Diog. iii. 9; viii. 84, 85.

[5] So Iambl. *in Nicom.* p. 105, 11; Proclus, *in Tim.* p. 1, Diehl.

existed earlier than the first century A.D. We know nothing of Timaios except what Plato tells us himself, and he may even be a fictitious character like the Eleatic Stranger. His name does not occur among the Lokrians in the Catalogue of Pythagoreans preserved by Iamblichos.[1] Besides this, the work does not fulfil the most important requirement, that of being in three books, which is always an essential feature of the story.[2]

Not one of the writers just mentioned professes to have seen the famous "three books";[3] but at a later date there were at least two works which claimed to represent them. Diels has shown how a treatise in three sections, entitled *Παιδευτικόν, πολιτικόν, φυσικόν*, was composed in the Ionic dialect and attributed to Pythagoras. It was largely based on the *Πυθαγορικαὶ ἀποφάσεις* of Aristoxenos, but its date is uncertain.[4] In the first century B.C., Demetrios Magnes was able to quote the opening words of the work published by Philolaos.[5] That, however, was written in Doric. Demetrios does not actually say it was by Philolaos himself, though it is no doubt the same work from which a number of extracts are preserved under his name in Stobaios and later writers. If it professed to be by Philolaos, that was not quite in accordance with the original story; but it is easy to see how his name

[1] Diels, *Vors.* p. 269.

[2] They are τὰ θρυλούμενα τρία βιβλία (Iambl. *V. Pyth.* 199), τὰ διαβόητα τρία βιβλία (Diog. viii. 15).

[3] As Mr. Bywater says (*J. Phil.* i. p. 29), the history of this work "reads like the history, not so much of a book, as of a literary *ignis fatuus* floating before the minds of imaginative writers."

[4] Diels, "Ein gefälschtes Pythagorasbuch" (*Arch.* iii. pp. 451 sqq.).

[5] Diog. viii. 85 (R. P. 63 b). Diels reads πρῶτον ἐκδοῦναι τῶν Πυθαγορικῶν <βιβλία καὶ ἐπιγράψαι Περὶ> Φύσεως.

may have become attached to it. We are told that the other book which passed under the name of Pythagoras was really by Lysis.[1] Boeckh has shown that the work ascribed to Philolaos probably consisted of three books also, and Proclus referred to it as the *Bakchai*,[2] a fanciful title which recalls the "Muses" of Herodotos. Two of the extracts in Stobaios bear it. It must be confessed that the whole story is very suspicious; but, as some of the best authorities still regard the fragments as partly genuine, it is necessary to look at them more closely.

The "Fragments of Philolaos."

141. Boeckh argued with great learning and skill that all the fragments preserved under the name of Philolaos were genuine; but no one will now go so far as this. The lengthy extract on the soul is given up even by those who maintain the genuineness of the rest.[3] It cannot be said that this position is plausible on the face of it. Boeckh saw there was no ground for supposing that there ever was more than a single work, and he drew the conclusion that we must accept all the remains as genuine or reject all as spurious.[4] As, however, Zeller and Diels still maintain the genuineness of most of the fragments, we cannot ignore them altogether. Arguments based on the doctrine contained in them would, it is true, present

[1] Diog. viii. 7.

[2] Proclus, *in Eucl.* p. 22, 15 (Friedlein). Cf. Boeckh, *Philolaos*, pp. 36 sqq. Boeckh refers to a sculptured group of *three* Bakchai, whom he supposes to be Ino, Agaue, and Autonoe.

[3] The passage is given in R. P. 68. For a full discussion of this and the other fragments, see Bywater, "On the Fragments attributed to Philolaus the Pythagorean" (*J. Phil.* i. pp. 21 sqq.).

[4] Boeckh, *Philolaos*, p. 38. Diels (*Vors.* p. 246) distinguishes the *Bakchai* from the three books Περὶ φύσιος (*ib.* p. 239). As, however, he identifies the latter with the "three books" bought from Philolaos, and regards it as genuine, this does not seriously affect the argument.

the appearance of a vicious circle at this stage. It is only in connexion with our other evidence that these can be introduced. But there are two serious objections to the fragments which may be mentioned at once. They are sufficiently strong to justify us in refusing to use them till we have ascertained from other sources what doctrines may fairly be attributed to the Pythagoreans of this date.

In the first place, we must ask a question which has not yet been faced. Is it likely that Philolaos should have written in Doric? Ionic was the dialect of all science and philosophy till the time of the Peloponnesian War, and there is no reason to suppose that the early Pythagoreans used any other.[1] Pythagoras was himself an Ionian, and it is by no means clear that in his time the Achaian states in which he founded his Order had already adopted the Dorian dialect.[2] Alkmaion of Kroton seems to have written in Ionic.[3] Diels says, it is true, that Philolaos and then Archytas were the first Pythagoreans to use the dialect of their homes;[4] but Philolaos can hardly be said to have had a home,[5] and the fragments of

[1] See Diels in *Arch.* iii. pp. 460 sqq.

[2] On the Achaian dialect, see O. Hoffmann in Collitz and Bechtel, *Dialekt-Inschriften*, vol. ii. p. 151. How slowly Doric penetrated into the Chalkidian states may be seen from the mixed dialect of the inscription of Mikythos of Rhegion (*Dial.-Inschr.* iii. 2, p. 498), which is later than 468-67 B.C. There is no reason to suppose that the Achaian dialect of Kroton was less tenacious of life.

[3] The scanty fragments contain one Doric form, ἔχοντι (fr. 1), but Alkmaion calls himself Κροτωνιήτης, which is very significant; for Κροτωνιάτας is the Achaian as well as the Doric form. He did not, therefore, write a mixed dialect like that referred to in the last note. It seems safest to assume with Wachtler, *De Alcmaeone Crotoniata*, pp. 21 sqq., that he used Ionic.

[4] *Arch.* iii. p. 460.

[5] He is distinctly called a Krotoniate in the extracts from Menon's Ἰατρικά (cf. Diog. viii. 84). It is true that Aristoxenos called him and

Archytas are not written in the dialect of Taras, but in what may be called "common Doric." Archytas may have found it convenient to use that dialect; but he is at least a generation later than Philolaos, which makes a great difference. There is evidence that, in the time of Philolaos and later, Ionic was still used even by the citizens of Dorian states for scientific purposes. Diogenes of Apollonia in Crete and the Syracusan historian Antiochos wrote in Ionic, while the medical writers of Dorian, Kos and Knidos, continue to use the same dialect. The forged work of Pythagoras referred to above, which some ascribed to Lysis, was in Ionic; and so was the work on the *Akousmata* attributed to Androkydes,[1] which shows that, even down to Alexandrian times, it was still believed that Ionic was the proper dialect for Pythagorean writings.

In the second place, there can be no doubt that one of the fragments refers to the five regular solids, four of which are identified with the elements of Empedokles.[2] Now Plato gives us to understand, in a well-known passage of the *Republic*, that stereometry had not been adequately investigated at the time he wrote,[3] and we have express testimony that the five "Platonic figures," as they were called, were discovered in the Academy. In the Scholia to Euclid we read

Eurytos Tarentines (Diog. viii. 46), but this only means that he settled at Taras after leaving Thebes. These variations are common in the case of migratory philosophers. Eurytos is also called a Krotoniate and a Metapontine (Iambl. *V. Pyth.* 148, 266). Cf. also p. 380, n. 1 on Leukippos, and p. 406, n. 1 on Hippon.

[1] For Androkydes, see Diels, *Vors.* p. 281. As Diels points out (*Arch.* iii. p. 461), even Lucian has sufficient sense of style to make Pythagoras speak Ionic.

[2] Cf. fr. 12=20 M. (R. P. 79), τὰ ἐν τᾷ σφαίρᾳ σώματα πέντε ἐντί.

[3] Plato, *Rep.* 528 b.

that the Pythagoreans only knew the cube, the pyramid (tetrahedron), and the dodecahedron, while the octahedron and the icosahedron were discovered by Theaitetos.[1] This sufficiently justifies us in regarding the "fragments of Philolaos" with something more than suspicion. We shall find more anachronisms as we go on.

142. We must look, then, for other evidence. From what has been said, it will be clear that we cannot safely take Plato as our guide to the original meaning of the Pythagorean theory, though it is certainly from him alone that we can learn to regard it sympathetically. Aristotle, on the other hand, was quite out of sympathy with Pythagorean ways of thinking, but took a great deal of pains to understand them. This was just because they played so great a part in the philosophy of Plato and his successors, and he had to make the relation of the two doctrines as clear as he could to himself and his disciples. What we have to do, then, is to interpret what Aristotle tells us in the spirit of Plato, and then to consider how the doctrine we arrive at in this way is related to the systems which had preceded it. It is a delicate operation, no doubt, but it has been made much safer

The Proble

[1] Heiberg's Euclid, vol. v. p. 654, 1, *Ἐν τούτῳ τῷ βιβλίῳ, τουτέστι τῷ ιγʹ, γράφεται τὰ λεγόμενα Πλάτωνος ε̄ σχήματα, ἃ αὐτοῦ μὲν οὐκ ἔστιν, τρία δὲ τῶν προειρημένων ε̄ σχημάτων τῶν Πυθαγορείων ἐστίν, ὅ τε κύβος καὶ ἡ πυραμὶς καὶ τὸ δωδεκάεδρον, Θεαιτήτου δὲ τό τε ὀκτάεδρον καὶ τὸ εἰκοσάεδρον.* It is no objection to this that, as Newbold points out (*Arch.* xix. p. 204), the inscription of the dodecahedron is more difficult than that of the octahedron and icosahedron. The Pythagoreans were not confined to strict Euclidean methods. It may further be noted that Tannery comes to a similar conclusion with regard to the musical scale described in the fragment of Philolaos. He says: "Il n'y a jamais eu, pour la division du tétracorde, une tradition pythagoricienne; on ne peut pas avec sûreté remonter plus haut que Platon ou qu'Archytas" (*Rev. de Philologie*, 1904, p. 244).

by recent discoveries in the early history of mathematics and medicine.

Zeller has cleared the ground by eliminating the purely Platonic elements which have crept into later accounts of the system. These are of two kinds. First of all, we have genuine Academic formulae, such as the identification of the Limit and the Unlimited with the One and the Indeterminate Dyad;[1] and secondly, there is the Neoplatonic doctrine which represents it as an opposition between God and Matter.[2] It is not necessary to repeat Zeller's arguments here, as no one will any longer attribute these doctrines to the Pythagoreans of the fifth century.

This simplifies the problem very considerably, but it is still extremely difficult. According to Aristotle, the Pythagoreans said *Things are numbers*, though that does not appear to be the doctrine of the fragments of "Philolaos." According to them, things *have* number, which make them knowable, while their real essence is something unknowable.[3] That would be intelligible enough, but the formula that things *are* numbers seems meaningless. We have seen reason for believing that it is due to Pythagoras himself (§ 52), though we did not feel able to say very clearly what he meant by it.

[1] Aristotle says distinctly (*Met.* A, 6. 987 b 25) that "to set up a dyad instead of the unlimited regarded as one, and to make the unlimited consist of the great and small, is distinctive of Plato." Zeller seems to make an unnecessary concession with regard to this passage (p. 368, n. 2; Eng. trans. p. 396, n. 1).

[2] Zeller, p. 369 sqq. (Eng. trans. p. 397 sqq.).

[3] For the doctrine of "Philolaos," cf. fr. 1=2 Ch. (R. P. 64); and for the unknowable ἐστὼ τῶν πραγμάτων, see fr. 3=4 Ch. (R. P. 67). It has a suspicious resemblance to the later ὕλη, which Aristotle would hardly have failed to note if he had ever seen the passage. He is always on the lookout for anticipations of ὕλη.

There is no such doubt as to his school. Aristotle says they used the formula in a cosmological sense. The world, according to them, was made of numbers in the same sense as others had said it was made of "four roots" or "innumerable seeds." It will not do to dismiss this as mysticism. Whatever we may think of Pythagoras, the Pythagoreans of the fifth century were scientific men, and they must have meant something quite definite. We shall, no doubt, have to say that they used the words *Things are numbers* in a somewhat non-natural sense, but there is no difficulty in such a supposition. We have seen already how the friends of Aristoxenos reinterpreted the old *Akousmata* (§ 44). The Pythagoreans had certainly a great veneration for the actual words of the Master (*αὐτὸς ἔφα*); but such veneration is often accompanied by a singular licence of interpretation. We shall start, then, from what Aristotle tells us about the numbers.

143. In the first place, Aristotle is quite decided in his opinion that Pythagoreanism was intended to be a cosmological system like the others. "Though the Pythagoreans," he tells us, "made use of less obvious first principles and elements than the rest, seeing that they did not derive them from sensible objects, yet all their discussions and studies had reference to nature alone. They describe the origin of the heavens, and they observe the phenomena of its parts, all that happens to it and all it does."[1] They apply their first principles entirely to these things, "agreeing apparently with the other natural philosophers in holding that reality was just what could be perceived by the senses, and is contained within the compass of

Aristotle on the Numbers

[1] Arist. *Met.* A, 8. 989 b 29 (R. P. 92 a).

the heavens,"[1] though "the first principles and causes of which they made use were really adequate to explain realities of a higher order than the sensible."[2]

The doctrine is more precisely stated by Aristotle to be that the elements of numbers are the elements of things, and that therefore things are numbers.[3] He is equally positive that these "things" are sensible things,[4] and indeed that they are bodies,[5] the bodies of which the world is constructed.[6] This construction of the world out of numbers was a real process in time, which the Pythagoreans described in detail.[7]

Further, the numbers were intended to be mathematical numbers, though they were not separated from the things of sense.[8] On the other hand, they were not mere predicates of something else, but had an independent reality of their own. "They did not hold that the limited and the unlimited and the one were

[1] Arist. *Met.* A, 8. 990 a 3, *ὁμολογοῦντες τοῖς ἄλλοις φυσιολόγοις ὅτι τό γ' ὂν τοῦτ' ἐστὶν ὅσον αἰσθητόν ἐστι καὶ περιείληφεν ὁ καλούμενος οὐρανός.*

[2] *Met. ib.* 990 a 5, *τὰς δ' αἰτίας καὶ τὰς ἀρχάς, ὥσπερ εἴπομεν, ἱκανὰς λέγουσιν ἐπαναβῆναι καὶ ἐπὶ τὰ ἀνωτέρω τῶν ὄντων, καὶ μᾶλλον ἢ τοῖς περὶ φύσεως λόγοις ἁρμοττούσας.*

[3] *Met.* A, 5. 986 a 1, *τὰ τῶν ἀριθμῶν στοιχεῖα τῶν ὄντων στοιχεῖα πάντων ὑπέλαβον εἶναι*; N, 3. 1090 a 22, *εἶναι μὲν ἀριθμοὺς ἐποίησαν τὰ ὄντα, οὐ χωριστοὺς δέ, ἀλλ' ἐξ ἀριθμῶν τὰ ὄντα.*

[4] *Met.* M, 6. 1080 b 2, *ὡς ἐκ τῶν ἀριθμῶν ἐνυπαρχόντων ὄντα τὰ αἰσθητά*; *ib.* 1080 b 17, *ἐκ τούτου (τοῦ μαθηματικοῦ ἀριθμοῦ) τὰς αἰσθητὰς οὐσίας συνεστάναι φασίν.*

[5] *Met.* M, 8. 1083 b 11, *τὰ σώματα ἐξ ἀριθμῶν εἶναι συγκείμενα*; *ib.* b 17, *ἐκεῖνοι δὲ τὸν ἀριθμὸν τὰ ὄντα λέγουσιν· τὰ γοῦν θεωρήματα προσάπτουσι τοῖς σώμασιν ὡς ἐξ ἐκείνων ὄντων τῶν ἀριθμῶν*; N, 3. 1090 a 32, *κατὰ μέντοι τὸ ποιεῖν ἐξ ἀριθμῶν τὰ φυσικὰ σώματα, ἐκ μὴ ἐχόντων βάρος μηδὲ κουφότητα ἔχοντα κουφότητα καὶ βάρος.*

[6] *Met.* A, 5. 986 a 2, *τὸν ὅλον οὐρανὸν ἁρμονίαν εἶναι καὶ ἀριθμόν*; A, 8. 990 a 21, *τὸν ἀριθμὸν τοῦτον ἐξ οὗ συνέστηκεν ὁ κόσμος*; M, 6. 1080 b 18, *τὸν γὰρ ὅλον οὐρανὸν κατασκευάζουσιν ἐξ ἀριθμῶν*; *de Caelo*, Γ, 1. 300 a 15, *τοῖς ἐξ ἀριθμῶν συνιστᾶσι τὸν οὐρανόν· ἔνιοι γὰρ τὴν φύσιν ἐξ ἀριθμῶν συνιστᾶσιν, ὥσπερ τῶν Πυθαγορείων τινές.*

[7] *Met.* N, 3. 1091 a 18, *κοσμοποιοῦσι καὶ φυσικῶς βούλονται λέγειν.*

[8] *Met.* M, 6. 1080 b 16; N, 3. 1090 a 20.

certain other substances, such as fire, water, or anything else of that sort; but that the unlimited itself and the one itself were the reality of the things of which they are predicated, and that is why they said that number was the reality of everything."[1] Accordingly the numbers are, in Aristotle's own language, not only the formal, but also the material, cause of things.[2] According to the Pythagoreans, things are made of numbers in the same sense as they were made of fire, air, or water in the theories of their predecessors.

Lastly, Aristotle notes that the point in which the Pythagoreans agreed with Plato was in giving numbers an independent reality of their own; while Plato differed from the Pythagoreans in holding that this reality was distinguishable from that of sensible things.[3] Let us consider these statements in detail.

144. Aristotle speaks of certain "elements" (στοιχεῖα) of numbers, which were also the elements of things. That, of course, is only his own way of putting the matter; but it is clearly the key to the problem, if we can discover what it means. Primarily, the "elements of number" are the Odd and the Even, but that does not seem to help us much. We find, however, that the Odd and Even were identified in a somewhat violent way with the Limit and the Unlimited, which we have seen reason to regard as the original principles of the Pythagorean cosmology. Aristotle tells us that it is the Even which gives things their unlimited character when it is contained in them and limited by the Odd,[4] and the

The elements of numbers.

[1] Arist. *Met.* A, 5. 987 a 15. [2] *Met. ib.* 986 a 15 (R. P. 66).

[3] *Met.* A, 6. 987 b 27, ὁ μὲν (Πλάτων) τοὺς ἀριθμοὺς παρὰ τὰ αἰσθητά, οἱ δ' (οἱ Πυθαγόρειοι) ἀριθμοὺς εἶναί φασιν αὐτὰ τὰ αἰσθητά.

[4] *Met.* A, 5. 986 a 17 (R. P. 66); *Phys.* Γ, 4. 203 a 10 (R. P. 66 a).

commentators are at one in understanding this to mean that the Even is in some way the cause of infinite divisibility. They get into great difficulties, however, when they try to show how this can be. Simplicius has preserved an explanation, in all probability Alexander's, to the effect that they called the even number unlimited "because every even is divided into equal parts, and what is divided into equal parts is unlimited in respect of bipartition; for division into equals and halves goes on *ad infinitum*. But, when the odd is added, it limits it; for it prevents its division into equal parts."[1] Now it is plain that we must not impute to the Pythagoreans the view that even numbers can be halved indefinitely. They had carefully studied the properties of the decad, and they must have known that the even numbers 6 and 10 do not admit of this. The explanation is really to be found in a fragment of Aristoxenos, where we read that "even numbers are those which are divided into equal parts, while odd numbers are divided into unequal parts and have a middle term."[2] This is still further elucidated by a passage which is quoted in Stobaios and ultimately goes back to Poseidonios. It runs: "When the odd is divided into two equal parts, a unit is left over in the middle; but when the even is so divided, an empty

[1] Simpl. *Phys.* p. 455, 20 (R. P. 66 a). I owe the passages which I have used in illustration of this subject to W. A. Heidel, "*Πέρας* and *ἄπειρον* in the Pythagorean Philosophy" (*Arch.* xiv. pp. 384 sqq.). The general principle of my interpretation is also the same as his, though I think that, by bringing the passage into connexion with the numerical figures, I have avoided the necessity of regarding the words *ἡ γὰρ εἰς ἴσα καὶ ἡμίση διαίρεσις ἐπ' ἄπειρον* as "an attempted elucidation added by Simplicius."

[2] Aristoxenos, fr. 81, *ap.* Stob. i. p. 20, 1, *ἐκ τῶν Ἀριστοξένου Περὶ ἀριθμητικῆς . . . τῶν δὲ ἀριθμῶν ἄρτιοι μὲν εἰσιν οἱ εἰς ἴσα διαιρούμενοι, περισσοὶ δὲ οἱ εἰς ἄνισα καὶ μέσον ἔχοντες.*

field is left, without a master and without a number, showing that it is defective and incomplete."[1] Again, Plutarch says: "In the division of numbers, the even, when parted in any direction, leaves as it were within itself . . . a field; but, when the same thing is done to the odd, there is always a middle left over from the division."[2] It is clear that all these passages refer to the same thing, and that can hardly be anything else than those arrangements of "terms" in patterns with which we are already familiar (§ 47). If we think of these, we shall see in what sense it is true that bipartition goes on *ad infinitum*. However high the number may be, the number of ways in which it can be equally divided will also increase.

145. In this way, then, the Odd and the Even were identified with the Limit and the Unlimited, and it is possible, though by no means certain, that Pythagoras himself had taken this step. In any case, there can be no doubt that by his Unlimited he meant something spatially extended, and we have seen that he identified it with air, night, or the void, so we are prepared to find that his followers also thought of the Unlimited as extended. Aristotle certainly regarded it so. He argues that, if the Unlimited is itself a

The numbers spatial.

[1] [Plut.] *ap.* Stob. i. p. 22, 19, *καὶ μὴν εἰς δύο διαιρουμένων ἴσα τοῦ μὲν περισσοῦ μονὰς ἐν μέσῳ περιέστι, τοῦ δὲ ἀρτίου κενὴ λείπεται χώρα καὶ ἀδέσποτος καὶ ἀνάριθμος, ὡς ἂν ἐνδεοῦς καὶ ἀτελοῦς ὄντος.*

[2] Plut. *de E apud Delphos*, 388 a, *ταῖς γὰρ εἰς ἴσα τομαῖς τῶν ἀριθμῶν, ὁ μὲν ἄρτιος πάντῃ διϊστάμενος ὑπολείπει τινὰ δεκτικὴν ἀρχὴν οἷον ἐν ἑαυτῷ καὶ χώραν, ἐν δὲ τῷ περιττῷ ταὐτὸ παθόντι μέσον ἀεὶ περίεστι τῆς νεμήσεως γόνιμον.* The words which I have omitted in translating refer to the further identification of Odd and Even with Male and Female. The passages quoted by Heidel might be added to. Cf., for instance, what Nikomachos says (p. 13, 10, Hoche), *ἔστι δὲ ἄρτιον μὲν ὃ οἷόν τε εἰς δύο ἴσα διαιρεθῆναι μονάδος μέσον μὴ παρεμπιπτούσης, περιττὸν δὲ τὸ μὴ δυνάμενον εἰς δύο ἴσα μερισθῆναι διὰ τὴν προειρημένην τῆς μονάδος μεσιτείαν.* He significantly adds that this definition is *ἐκ τῆς δημώδους ὑπολήψεως.*

reality, and not merely the predicate of some other reality, then every part of it must be unlimited too, just as every part of air is air.[1] The same thing is implied in his statement that the Pythagorean Unlimited was outside the heavens.[2] Further than this, it is hardly safe to go. Philolaos and his followers cannot have regarded the Unlimited in the old Pythagorean way as Air; for, as we shall see, they adopted the theory of Empedokles as to that "element," and accounted for it otherwise. On the other hand, they can hardly have regarded it as an absolute void; for that conception was introduced by the Atomists. It is enough to say that they meant by the Unlimited the *res extensa*, without analysing that conception any further.

As the Unlimited is spatial, the Limit must be spatial too, and we should naturally expect to find that the point, the line, and the surface were regarded as all forms of the Limit. That was the later doctrine; but the characteristic feature of Pythagoreanism is just that the point was not regarded as a limit, but as the first product of the Limit and the Unlimited, and was identified with the arithmetical unit. According to this view, then, the point has one dimension, the line two, the surface three, and the solid four.[3] In other

[1] Arist. *Phys.* Γ, 4. 204 a 20 sqq., especially a 26, *ἀλλὰ μὴν ὥσπερ ἀέρος ἀὴρ μέρος, οὕτω καὶ ἄπειρον ἀπείρου, εἴ γε οὐσία ἐστὶ καὶ ἀρχή.*

[2] See Chap. II. § 53.

[3] Cf. Speusippos in the extract preserved in the *Theologumena arithmetica*, p. 61 (Diels, *Vors.* p. 235), *τὸ μὴν γὰρ ᾱ στιγμή, τὸ δὲ β̄ γραμμή, τὸ δὲ τρία τρίγωνον, τὸ δὲ δ̄ πυραμίς.* We know that Speusippos is following Philolaos here. Arist. *Met.* Z, 11. 1036 b 12, *καὶ ἀνάγουσι πάντα εἰς τοὺς ἀριθμούς, καὶ γραμμῆς τὸν λόγον τὸν τῶν δύο εἶναί φασιν.* The matter is clearly put in the Scholia on Euclid (p. 78, 19, Heiberg), *οἱ δὲ Πυθαγόρειοι τὸ μὲν σημεῖον ἀνάλογον ἐλάμβανον μονάδι, δυάδι δὲ τὴν γραμμήν, καὶ τριάδι τὸ ἐπίπεδον, τετράδι δὲ τὸ σῶμα. καίτοι Ἀριστοτέλης τριαδικῶς προσεληλυθέναι φησὶ τὸ σῶμα, ὡς διάστημα πρῶτον λαμβάνων τὴν γραμμήν.*

words, the Pythagorean points have magnitude, their lines breadth, and their surfaces thickness. The whole theory, in short, turns on the definition of the point as a unit "having position."[1] It was out of such elements that it seemed possible to construct a world.

146. It is clear that this way of regarding the point, the line, and the surface is closely bound up with the practice of representing numbers by dots arranged in symmetrical patterns, which we have seen reason for attributing to the Pythagoreans (§ 47). The science of geometry had already made considerable advances, but the old view of quantity as a sum of units had not been revised, and so a doctrine such as we have indicated was inevitable. This is the true answer to Zeller's contention that to regard the Pythagorean numbers as spatial is to ignore the fact that the doctrine was originally arithmetical rather than geometrical. Our interpretation takes full account of that fact, and indeed makes the peculiarities of the whole system depend upon it. Aristotle is very decided as to the Pythagorean points having magnitude. "They construct the whole world out of numbers," he tells us, "but they suppose the units have magnitude. As to how the first unit with magnitude arose, they appear to be at a loss."[2] Zeller holds that this is only an inference of Aristotle's,[3] and he is probably right in this sense, that the Pythagoreans never felt the need of saying in so many words that points had

The numbers as magnitudes.

[1] The identification of the point with the unit is referred to by Aristotle, *Phys.* E, 3. 227 a 27.

[2] Arist. *Met.* M, 6. 1080 b 18 sqq., 1083 b 8 sqq.; *de Caelo*, Γ, 1. 300 a 16 (R. P. 76 a).

[3] Zeller, p. 381.

magnitude. It does seem probable, however, that they called them ὄγκοι.[1]

Nor is Zeller's other argument against the view that the Pythagorean numbers were spatial any more inconsistent with the way in which we have now stated it. He himself allows, and indeed insists, that in the Pythagorean cosmology the numbers were spatial, but he raises difficulties about the other parts of the system. There are other things, such as the Soul and Justice and Opportunity, which are said to be numbers, and which cannot be regarded as constructed of points, lines, and surfaces.[2] Now it appears to me that this is just the meaning of a passage in which Aristotle criticises the Pythagoreans. They held, he says, that in one part of the world Opinion prevailed, while a little above it or below it were to be found Injustice or Separation or Mixture, each of which was, according to them, a number. But in the very same regions of the heavens were to be found things having magnitude which were also numbers. How can this be, since Justice has no magnitude?[3] This means

[1] We learn from Plato, *Theaet.* 148 b 1, that Theaitetos called surds, what Euclid calls δυνάμει σύμμετρα, by the name of δυνάμεις, while rational square roots were called μήκη. Now in *Tim.* 31 c 4 we find a division of numbers into ὄγκοι and δυνάμεις, which seem to mean rational and irrational quantities. Cf. also the use of ὄγκοι in *Parm.* 164 d. Zeno in his fourth argument about motion, which, we shall see (§ 163), was directed against the Pythagoreans, used ὄγκοι for points. Aetios, i. 3, 19 (R. P. 76 b), says that Ekphantos of Syracuse was the first of the Pythagoreans to say that their units were corporeal. Probably, however, "Ekphantos" was a personage in a dialogue of Herakleides (Tannery, *Arch.* xi. pp. 263 sqq.), and Herakleides called the monads ἄναρμοι ὄγκοι (Galen, *Hist. Phil.* 18; *Dox.* p. 610).

[2] Zeller, p. 382.

[3] Arist. *Met.* A, 8. 990 a 22 (R. P. 81 e). I read and interpret thus: "For, seeing that, according to them, Opinion and Opportunity are in a given part of the world, and a little above or below them Injustice and Separation and Mixture,—in proof of which they allege that each of these

surely that the Pythagoreans had failed to give any clear account of the relation between these more or less fanciful analogies and their quasi-geometrical construction of the universe. And this is, after all, really Zeller's own view. He has shown that in the Pythagorean cosmology the numbers were regarded as spatial,[1] and he has also shown that the cosmology was the whole of the system.[2] We have only to bring these two things together to arrive at the interpretation given above.

147. When we come to details, we seem to see that what distinguished the Pythagoreanism of this period from its earlier form was that it sought to adapt itself to the new theory of "elements." It is just this which makes it necessary for us to take up the consideration of the system once more in connexion with the pluralists. When the Pythagoreans returned to Southern Italy, they must have found views prevalent there which imperatively demanded a partial reconstruction of their own system. We do not know that Empedokles founded a philosophical society, but there can be no doubt of his influence on the medical school of these regions; and we also know now that Philolaos

The numbers and the elements.

is a number,—and seeing that it is also the case (reading συμβαίνῃ with Bonitz) that there is already in that part of the world a number of composite magnitudes (*i.e.* composed of the Limit and the Unlimited), because those affections (of number) are attached to their respective regions;—(seeing that they hold these two things), the question arises whether the number which we are to understand each of these things (Opinion, etc.) to be is the same as the number in the world (*i.e.* the cosmological number) or a different one." I cannot doubt that these are the extended numbers which are composed (συνίσταται) of the elements of number, the limited and the unlimited, or, as Aristotle here says, the "affections of number," the odd and the even. Zeller's view that "celestial bodies" are meant comes near this, but the application is too narrow. Nor is it the number (πλῆθος) of those bodies that is in question, but their magnitude (μέγεθος). For other views of the passage, see Zeller, p. 391, n. 1.

[1] Zeller, p. 404.

[2] *Ibid.* pp. 467 sqq.

played a part in the history of medicine.[1] This discovery gives us the clue to the historical connexion, which formerly seemed obscure. The tradition is that the Pythagoreans explained the elements as built up of geometrical figures, a theory which we can study for ourselves in the more developed form which it attained in Plato's *Timaeus*.[2] If they were to retain their position as the leaders of medical study in Italy, they were bound to account for the elements.

We must not take it for granted, however, that the Pythagorean construction of the elements was exactly the same as that which we find in Plato's *Timaeus*. It has been mentioned already that there is good reason for believing they only knew three of the regular solids, the cube, the pyramid (tetrahedron), and the dodecahedron.[3] Now it is very significant that Plato starts from fire and earth,[4] and in the construction of the elements proceeds in such a way that the octahedron and the icosahedron can easily be transformed into pyramids, while the cube and the dodecahedron cannot. From this it follows that, while air and water pass readily into fire, earth cannot do so,[5] and the dodeca-

[1] All this has been put in its true light by the publication of the extract from Menon's Ἰατρικά, on which see p. 322, n. 2.

[2] In Aet. ii. 6, 5 (R. P. 80) the theory is ascribed to Pythagoras, which is an anachronism, as the mention of "elements" shows it must be later than Empedokles. In his extract from the same source, Achilles says *οἱ Πυθαγόρειοι*, which doubtless represents Theophrastos better. There is a fragment of "Philolaos" bearing on the subject (R. P. 79), where the regular solids must be meant by *τὰ ἐν τᾷ σφαίρᾳ σώματα*.

[3] See above, p. 329, n. 1.

[4] Plato, *Tim.* 31 b 5.

[5] Plato, *Tim.* 54 c 4. It is to be observed that in *Tim.* 48 b 5 Plato says of the construction of the elements *οὐδείς πω γένεσιν αὐτῶν μεμήνυκεν*, which implies that there is some novelty in the theory as he makes Timaios state it. If we read the passage in the light of what has been said in § 141, we shall be inclined to believe that Plato is working out the Pythagorean doctrine on the lines of the discovery of Theaitetos. There is another

hedron is reserved for another purpose, which we shall consider presently. This would exactly suit the Pythagorean system; for it would leave room for a dualism of the kind outlined in the Second Part of the poem of Parmenides. We know that Hippasos made Fire the first principle, and we see from the *Timaeus* how it would be possible to represent air and water as forms of fire. The other element is, however, earth, not air, as we have seen reason to believe that it was in early Pythagoreanism. That would be a natural result of the discovery of atmospheric air by Empedokles and of his general theory of the elements. It would also explain the puzzling fact, which we had to leave unexplained above, that Aristotle identifies the two "forms" spoken of by Parmenides with Fire and Earth.[1] All this is, of course, problematical; but it will not be found easy to account otherwise for the facts.

148. The most interesting point in the theory is, perhaps, the use made of the dodecahedron. It was identified, we are told, with the "sphere of the universe," or, as it is put in the Philolaic fragment, with the "hull of the sphere."[2] Whatever we may think of the authenticity of the fragments, there is no reason to doubt that this is a genuine Pythagorean expression, and it must be taken in close connexion with the word "keel" The dodecahedron.

indication of the same thing in Arist. *Gen. Corr.* B, 3. 330 b 16, where we are told that, in the Διαιρέσεις, Plato assumed three elements, but made the middle one a mixture. This is stated in close connexion with the ascription of Fire and Earth to Parmenides.

[1] See above, Chap. IV. p. 213, n. 2.

[2] Aet. ii. 6, 5 (R. P. 80); "Philolaos," fr. 12 (=20 M.; R. P. 79). On the ὁλκάς, see Gundermann in *Rhein. Mus.* 1904, pp. 145 sqq. I agree with him in holding that the reading is sound, and that the word means "ship," but I think that it is the structure, not the motion, of a ship which is the point of comparison.

applied to the central fire.[1] The structure of the world was compared to the building of a ship, an idea of which there are other traces.[2] The key to what we are told of the dodecahedron is given by Plato. In the *Phaedo* we read that the "true earth," if looked at from above, is "many-coloured like the balls that are made of twelve pieces of leather."[3] In the *Timaeus* the same thing is referred to in these words: "Further, as there is still one construction left, the fifth, God made use of it for the universe when he painted it."[4] The point is that the dodecahedron approaches more nearly to the sphere than any other of the regular solids. The twelve pieces of leather used to make a ball would all be regular pentagons; and, if the material were not flexible like leather, we should have a dodecahedron instead of a sphere. This points to the Pythagoreans having had at least the rudiments of the "method of exhaustion" formulated later by Eudoxos. They must have studied the properties of circles by means of inscribed polygons and those of spheres by means of inscribed solids.[5] That gives us a high idea of their mathematical attainments; but

[1] Aet. ii. 4, 15, *ὅπερ τρόπεως δίκην προϋπεβάλετο τῇ τοῦ παντὸς <σφαίρᾳ> ὁ δημιουργὸς θεός.*

[2] Cf. the *ὑποζώματα* of Plato, *Rep.* 616 c 3. As *ὕλη* generally means "timber" for shipbuilding (when it does not mean firewood), I suggest that we should look in this direction for an explanation of the technical use of the word in later philosophy. Cf. Plato, *Phileb.* 54 c 1, *γενέσεως . . . ἕνεκα . . . πᾶσαν ὕλην παρατίθεσθαι πᾶσιν*, which is part of the answer to the question *πότερα πλοίων ναυπηγίαν ἕνεκα φῂς γίγνεσθαι μᾶλλον ἢ πλοῖα ἕνεκα ναυπηγίας;* (*ib.* b 2); *Tim.* 69 a 6, *οἷα τέκτοσιν ἡμῖν ὕλη παράκειται.*

[3] Plato, *Phd.* 110 b 6, *ὥσπερ οἱ δωδεκάσκυτοι σφαῖραι* with Wyttenbach's note.

[4] Plato, *Tim.* 55 c 4. Neither this passage nor the last can refer to the Zodiac, which would be described by a dodecagon, not a dodecahedron. What is implied is the division of the heavens into twelve pentagonal fields.

[5] Gow, *Short History of Greek Mathematics*, pp. 164 sqq.

that it is not too high, is shown by the fact that the famous lunules of Hippokrates date from the middle of the fifth century. The inclusion of *straight* and *curved* in the "table of opposites" under the head of Limit and Unlimited points in the same direction.[1]

The tradition confirms in an interesting way the importance of the dodecahedron in the Pythagorean system. According to one account, Hippasos was drowned at sea for revealing its construction and claiming the discovery as his own.[2] What that construction was, we may partially infer from the fact that the Pythagoreans adopted the pentagram or *pentalpha* as their symbol. The use of this figure in later magic is well known; and Paracelsus still employed it as a symbol of health, which is exactly what the Pythagoreans called it.[3]

149. The view that the soul is a "harmony," or rather an attunement, is intimately connected with the theory of the four elements. It cannot have belonged to the earliest form of Pythagoreanism; for, as shown in Plato's *Phaedo*, it is quite inconsistent with the idea that the soul can exist independently of the body. It is the very opposite of the belief that "any soul can enter any body."[4] On the other hand, we know also from the *Phaedo* that it was accepted by Simmias and Kebes, who had heard Philolaos at Thebes, and by Echekrates of Phleious, who was the disciple of

The Soul a "harmony."

[1] This is pointed out by Kinkel, *Gesch. der Phil.* vol. i. p. 121.

[2] Iambl. *V. Pyth.* 247. Cf. above, Chap. II. p. 117, n. 3.

[3] See Gow, *Short History of Greek Mathematics*, p. 151, and the passages there referred to, adding Schol. Luc. p. 234, 21, Rabe, *τὸ πεντάγραμμον*] *ὅτι τὸ ἐν τῇ συνηθείᾳ λεγόμενον πένταλφα σύμβολον ἦν πρὸς ἀλλήλους Πυθαγορείων ἀναγνωριστικὸν καὶ τούτῳ ἐν ταῖς ἐπιστολαῖς ἐχρῶντο.*

[4] Arist. *de An.* A, 3. 407 b 20 (R. P. 86 c).

Philolaos and Eurytos.[1] The account of the doctrine given by Plato is quite in accordance with the view that it was of medical origin. Simmias says: "Our body being, as it were, strung and held together by the warm and the cold, the dry and the moist, and things of that sort, our soul is a sort of temperament and attunement of these, when they are mingled with one another well and in due proportion. If, then, our soul is an attunement, it is clear that, when the body has been relaxed or strung up out of measure by diseases and other ills, the soul must necessarily perish at once."[2] This is clearly an application of the theory of Alkmaion (§ 96), and is in accordance with the views of the Sicilian school of medicine. It completes the evidence that the Pythagoreanism of the end of the fifth century was an adaptation of the old doctrine to the new principles introduced by Empedokles.

The central fire.

150. The planetary system which Aristotle attributes to "the Pythagoreans" and Aetios to Philolaos is sufficiently remarkable.[3] The earth is no longer in the middle of the world; its place is taken by a central fire, which is not to be identified with the sun. Round this fire revolve ten bodies. First comes the *Antichthon* or Counter-earth, and next the earth, which thus becomes one of the planets. After the earth comes the moon, then the sun, the five planets, and the heaven of the fixed stars. We do not see the central fire and the *antichthon* because the side of the earth on which we live is always turned away from

[1] Plato, *Phd.* 85 e sqq.; and for Echekrates, *ib.* 88 d.

[2] Plato, *Phd.* 86 b 7–c 5.

[3] For the authorities, see R. P. 81-83. The attribution of the theory to Philolaos is perhaps due to Poseidonios. The "three books" were doubtless in existence by his time.

them. This is to be explained by the analogy of the moon. That body always presents the same face to us; and men living on the other side of it would never see the earth. This implies, of course, that all these bodies rotate on their axes in the same time as they revolve round the central fire.[1]

It is not very easy to accept the view that this system was taught by Philolaos. Aristotle nowhere mentions him in connexion with it, and in the *Phaedo* Plato gives a description of the earth and its position in the world which is entirely opposed to it, but is accepted without demur by Simmias the disciple of Philolaos.[2] It is undoubtedly a Pythagorean theory, however, and marks a noticeable advance on the Ionian views then current at Athens. It is clear too that Plato states it as something of a novelty that the earth does not require the support of air or anything of the sort to keep it in its place. Even Anaxagoras had not been able to shake himself free of that idea, and Demokritos still held it.[3] The natural inference from the *Phaedo* would certainly be that the theory of a spherical earth, kept in the middle of the world by its equilibrium, was that of Philolaos himself. If so, the doctrine of the central fire would belong to a somewhat later generation of the school, and Plato may

[1] Plato attributes an axial rotation to the heavenly bodies (*Tim.* 40 a 7), which must be of this kind. It is quite likely that the Pythagoreans already did so, though Aristotle was unable to see the point. He says (*de Caelo*, B, 8. 290 a 24), ἀλλὰ μὴν ὅτι οὐδὲ κυλίεται τὰ ἄστρα, φανερόν· τὸ μὲν γὰρ κυλιόμενον στρέφεσθαι ἀνάγκη, τῆς δὲ σελήνης ἀεὶ δηλόν ἐστι τὸ καλούμενον πρόσωπον. This, of course, is just what proves it does rotate.

[2] Plato, *Phd.* 108 e 4 sqq. Simmias assents to this doctrine in the emphatic words Καὶ ὀρθῶς γε.

[3] The primitive character of the astronomy taught by Demokritos as compared with that of Plato is the best evidence of the value of the Pythagorean researches.

have learnt it from Archytas and his friends after he had written the *Phaedo*. However that may be, it is of such importance that it cannot be omitted here.

It is commonly supposed that the revolution of the earth round the central fire was intended to account for the alternation of day and night, and it is clear that an orbital motion of the kind just described would have the same effect as the rotation of the earth on its axis. As the same side of the earth is always turned to the central fire, the side upon which we live will be turned towards the sun when the earth is on the same side of the central fire, and turned away from it when the earth and sun are on opposite sides. This view appears to derive some support from the statement of Aristotle that the earth "being in motion round the centre, produces day and night."[1] That remark, however, would prove too much; for in the *Timaeus* Plato calls the earth "the guardian and artificer of night and day," while at the same time he declares that the alternation of day and night is caused by the diurnal revolution of the heavens.[2] That is explained, no doubt quite rightly, by saying that, even if the earth were regarded as at rest, it could still be said to produce day and night; for night is due to the intervention of the earth between the sun and the hemisphere opposite to it. If we remember how recent was the discovery that night was the shadow of the earth, we shall see how it may have been worth while to say this explicitly.

In any case, it is wholly incredible that the heaven

[1] Arist. *de Caelo*, B, 13. 293 a 18 sqq. (R. P. 83).

[2] Plato, *Tim.* 40 c 1, (γῆν) φύλακα καὶ δημιουργὸν νυκτός τε καὶ ἡμέρας ἐμηχανήσατο. On the other hand, νὺξ μὲν οὖν ἡμέρα τε γέγονεν οὕτως καὶ διὰ ταῦτα, ἡ τῆς μιᾶς καὶ φρονιμωτάτης κυκλήσεως περίοδος (39 c 1).

of the fixed stars should have been regarded as stationary. That would have been the most startling paradox that any scientific man had yet propounded, and we should have expected the comic poets and popular literature generally to raise the cry of atheism at once. Above all, we should have expected Aristotle to say something about it. He made the circular motion of the heavens the very keystone of his system, and would have regarded the theory of a stationary heaven as blasphemous. Now he argues against those who, like the Pythagoreans and Plato, regarded the earth as in motion;[1] but he does not attribute the view that the heavens are stationary to any one. There is no necessary connexion between the two ideas. All the heavenly bodies may be moving as rapidly as we please, provided that their relative motions are such as to account for the phenomena.[2]

It seems probable that the theory of the earth's revolution round the central fire really originated in the account given by Empedokles of the sun's light. The two things are brought into close connexion by Aetios, who says that Empedokles believed in two suns, while Philolaos believed in two or even in three.[3]

[1] Arist. *de Caelo*, B, 13. 293 b 15 sqq.

[2] Boeckh admitted a very slow motion of the heaven of the fixed stars, which he at first supposed to account for the precession of the equinoxes, though he afterwards abandoned that hypothesis (*Untersuchungen*, p. 93). But, as Dreyer admits (*Planetary Systems*, p. 49), it is "not . . . necessary with Boeckh to suppose the motion of the starry sphere to have been an exceedingly slow one, as it might in any case escape direct observation."

[3] Aet. ii. 20, 13 (Chap. IV. p. 275, n. 1); cf. *ib.* 12 (of Philolaos), *ὥστε τρόπον τινὰ διττοὺς ἡλίους γίγνεσθαι, τό τε ἐν τῷ οὐρανῷ πυρῶδες καὶ τὸ ἀπ' αὐτοῦ πυροειδὲς κατὰ τὸ ἐσοπτροειδές· εἰ μή τις καὶ τρίτον λέξει τὴν ἀπὸ τοῦ ἐνόπτρου κατ' ἀνάκλασιν διασπειρομένην πρὸς ἡμᾶς αὐγήν.* Here *τὸ ἐν τῷ οὐρανῷ πυρῶδες* is the central fire, in accordance with the use of the word *οὐρανός* explained in another passage of Aetios, Stob. *Ecl.* i. p. 196, 18 (R. P. 81). It seems to me that these strange notices must be fragments of an attempt to show how the heliocentric hypothesis arose from the

The theory of Empedokles is unsatisfactory in so far as it gives two inconsistent explanations of night. It is, we have seen, the shadow of the earth; but at the same time Empedokles recognised a fiery diurnal hemisphere and a nocturnal hemisphere with only a little fire in it.[1] All this could be simplified by the hypothesis of a central fire which is the true source of light. Such a theory would, in fact, be the natural issue of the recent discoveries as to the moon's light and the cause of eclipses, if that theory were extended so as to include the sun.

The central fire received a number of mythological names. It was called the Hestia or "hearth of the universe," the "house" or "watch-tower" of Zeus, and the "mother of the gods."[2] That was in the manner of the school; but these names must not blind us to the fact that we are dealing with a real scientific hypothesis. It was a great thing to see that the phenomena could best be "saved" by a central luminary, and that the earth must therefore be a revolving sphere like the planets. Indeed, we are almost tempted to say that the identification of the central fire with the sun, which was suggested for the first time in the Academy, is a mere detail in comparison. The great thing was that the earth should definitely take its place among the planets; for once it has done so, we can proceed to search for the true "hearth" of the planetary system at our leisure. It is probable, at any rate, that it was this theory which made it possible

theory of Empedokles as to the sun's light. The meaning is that the central fire really was the sun, but that Philolaos unnecessarily duplicated it by supposing the visible sun to be its reflexion.

[1] Chap. VI. § 113.

[2] Aet. i. 7, 7 (R. P. 81). Procl. *in Tim.* p. 106, 22, Diehl (R. P. 83 e).

for Herakleides of Pontos and Aristarchos of Samos to reach the heliocentric hypothesis,[1] and it was certainly Aristotle's reversion to the geocentric theory which made it necessary for Copernicus to discover the truth afresh. We have his own word for it that the Pythagorean theory put him on the right track.[2]

151. The existence of the *antichthon* was also a hypothesis intended to account for the phenomena of eclipses. In one place, indeed, Aristotle says that the Pythagoreans invented it in order to bring the number of revolving bodies up to ten;[3] but that is a mere sally, and Aristotle really knew better. In his work on the Pythagoreans, we are told, he said that eclipses of the moon were caused sometimes by the intervention of the earth and sometimes by that of the *antichthon*; and the same statement was made by Philip of Opous, a very competent authority on the matter.[4] Indeed, Aristotle shows in another passage exactly how the theory originated. He tells us that some thought there might be a considerable number of bodies revolving round the centre, though invisible

The *antichthon*.

[1] On these points, see Staigmüller, *Beiträge zur Gesch. der Naturwissenschaften im klassichen Altertume* (Progr., Stuttgart, 1899); and "Herakleides Pontikos und das heliokentrische System" (*Arch.* xv. pp. 141 sqq.). Though, for reasons which will partly appear from the following pages, I should not put the matter exactly as Staigmüller does, I have no doubt that he is substantially right. Diels had already expressed his adhesion to the view that Herakleides was the real author of the heliocentric hypothesis (*Berl. Sitzb.*, 1893, p. 18).

[2] In his letter to Pope Paul III., Copernicus quotes Plut. *Plac.* iii. 13, 2-3 (R. P. 83 a), and adds "Inde igitur occasionem nactus, coepi et ego de terrae mobilitate cogitare." The whole passage is paraphrased by Dreyer, *Planetary Systems*, p. 311. Cf. also the passage from the original MS., which was first printed in the edition of 1873, translated by Dreyer, *ib.* pp. 314 sqq.

[3] Arist. *Met.* A, 5. 986 a 3 (R. P. 83 b).

[4] Aet. ii. 29, 4, *τῶν Πυθαγορείων τινὲς κατὰ τὴν Ἀριστοτέλειον ἱστορίαν καὶ τὴν Φιλίππου τοῦ Ὀπουντίου ἀπόφασιν ἀνταυγείᾳ καὶ ἀντιφράξει τοτὲ μὲν τῆς γῆς, τοτὲ δὲ τῆς ἀντίχθονος (ἐκλείπειν τὴν σελήνην).*

to us because of the intervention of the earth, and that they accounted in this way for there being more eclipses of the moon than of the sun.[1] This is mentioned in close connexion with the *antichthon*, so there is no doubt that Aristotle regarded the two hypotheses as of the same nature. The history of the theory seems to be this. Anaximenes had assumed the existence of dark planets to account for the frequency of lunar eclipses (§ 29), and Anaxagoras had revived that view (§ 135). Certain Pythagoreans[2] had placed these dark planets between the earth and the central fire in order to account for their invisibility, and the next stage was to reduce them to a single body. Here again we see how the Pythagoreans tried to simplify the hypotheses of their predecessors.

Planetary motions.

152. We must not assume that even the later Pythagoreans made the sun, moon, and planets, including the earth, revolve in the opposite direction to the heaven of the fixed stars. It is true that Alkmaion is said to have agreed with "some of the mathematicians"[3] in holding this view, but it is never ascribed to Pythagoras or even to Philolaos. The old theory was, as we have seen (§ 54), that all the heavenly bodies revolved in the same direction, from east to west, but that the planets revolved more slowly the further they were removed

[1] Arist. *de Caelo*, B, 13. 293 b 21, *ἐνίοις δὲ δοκεῖ καὶ πλείω σώματα τοιαῦτα ἐνδέχεσθαι φέρεσθαι περὶ τὸ μέσον ἡμῖν ἄδηλα διὰ τὴν ἐπιπρόσθησιν τῆς γῆς. διὸ καὶ τὰς τῆς σελήνης ἐκλείψεις πλείους ἢ τὰς τοῦ ἡλίου γίγνεσθαί φασιν· τῶν γὰρ φερομένων ἕκαστον ἀντιφράττειν αὐτήν, ἀλλ' οὐ μόνον τὴν γῆν.*

[2] It is not expressly stated that they were Pythagoreans, but it is natural to suppose so. Such, at least, was Alexander's opinion (Simpl. *de Caelo*, p. 515, 25).

[3] The term *οἱ μαθηματικοί* is that used by Poseidonios for the Chaldæan astrologers (Berossos). Diels, *Elementum*, p. 11, n. 3. As we have seen, the Babylonians knew the planets better than the Greeks.

from the heavens, so that those which are nearest the earth are "overtaken" by those that are further away. This view was still maintained by Demokritos, and that it was also Pythagorean, seems to follow from what we are told about the "harmony of the spheres." We have seen (§ 54) that we cannot attribute this theory in its later form to the Pythagoreans of the fifth century, but we have the express testimony of Aristotle to the fact that those Pythagoreans whose doctrine he knew believed that the heavenly bodies produced musical notes in their courses. Further, the velocities of these bodies depended on the distances between them, and these corresponded to the intervals of the octave. He distinctly implies that the heaven of the fixed stars takes part in the concert; for he mentions "the sun, the moon, and the stars, so great in magnitude and in number as they are," a phrase which cannot refer solely or chiefly to the remaining five planets.[1] Further, we are told that the slower bodies give out a deep note and the swifter a high note.[2] Now the prevailing tradition gives the high note of the octave to the heaven of the fixed stars,[3] from which it follows

[1] Arist. *de Caelo*, B, 9. 290 b 12 sqq. (R. P. 82).

[2] Alexander, *in Met.* p. 39, 24 (from Aristotle's work on the Pythagoreans), *τῶν γὰρ σωμάτων τῶν περὶ τὸ μέσον φερομένων ἐν ἀναλογίᾳ τὰς ἀποστάσεις ἐχόντων . . . ποιούντων δὲ καὶ ψόφον ἐν τῷ κινεῖσθαι τῶν μὲν βραδυτέρων βαρύν, τῶν δὲ ταχυτέρων ὀξύν.* We must not attribute the identification of the seven planets with the seven strings of the heptachord to the Pythagoreans of this date. Mercury and Venus have in the long run the same velocity as the sun, and we must take in the earth and the fixed stars. We can even find room for the *antichthon* as *προσλαμβανόμενος*.

[3] For the various systems, see Boeckh, *Kleine Schriften*, vol. iii. pp. 169 sqq., and Carl v. Jan, "Die Harmonie der Sphären" (*Philol.* 1893, pp. 13 sqq.). They vary with the astronomy of their authors, but they bear witness to the fact stated in the text. Many give the highest note to Saturn and the lowest to the Moon, while others reverse this. The system which corresponds best, however, with the Pythagorean planetary system must include the heaven of the fixed stars and the earth. It is that upon which

that all the heavenly bodies revolve in the same direction, and that their velocity increases in proportion to their distance from the centre.

The theory that the proper motion of the sun, moon, and planets is from west to east, and that they also share in the motion from east to west of the heaven of the fixed stars, makes its first appearance in the Myth of Er in Plato's *Republic*, and is fully worked out in the *Timaeus*. In the *Republic* it is still associated with the "harmony of the spheres," though we are not told how it is reconciled with that theory in detail.[1] In the *Timaeus* we read that the slowest of the heavenly bodies appear the fastest and *vice versa*; and, as this statement is put into the mouth of a Pythagorean, we might suppose the theory of a composite movement to have been anticipated by some members at least of that school.[2] That is, of course, possible; for the

the verses of Alexander of Ephesos quoted by Theon of Smyrna, p. 140, 4, are based:

> γαῖα μὲν οὖν ὑπάτη τε βαρεῖά τε μέσσοθι ναίει·
> ἀπλανέων δὲ σφαῖρα συνημμένη ἔπλετο νήτη, κ.τ.λ.

The "base of Heaven's deep Organ" in Milton's "ninefold harmony" (*Hymn on the Nativity*, xiii.) implies the reverse of this.

[1] The difficulty appears clearly in Adam's note on *Republic*, 617 b (vol. ii. p. 452). There the ἀπλανής appears rightly as the νήτη, while Saturn, which comes next to it, is the ὑπάτη. It is inconceivable that this should have been the original scale. Aristotle touches upon the point (*de Caelo*, B, 10. 291 a 29 sqq.); and Simplicius sensibly observes (*de Caelo*, p. 476, 11), οἱ δὲ πάσας τὰς σφαίρας τὴν αὐτὴν λέγοντες κίνησιν τὴν ἀπ' ἀνατολῶν κινεῖσθαι καθ' ὑπόληψιν (ought not the reading to be ὑπόλειψιν?), ὥστε τὴν μὲν Κρονίαν σφαῖραν συναποκαθίστασθαι καθ' ἡμέραν τῇ ἀπλανεῖ παρ' ὀλίγον, τὴν δὲ τοῦ Διὸς παρὰ πλέον καὶ ἐφεξῆς οὕτως, οὗτοι πολλὰς μὲν ἄλλας ἀπορίας ἐκφεύγουσι, but their ὑπόθεσις is ἀδύνατος. This is what led to the return to the geocentric hypothesis and the exclusion of earth and ἀπλανής from the ἁρμονία. The only solution would have been to make the earth rotate on its axis or revolve round the central fire in twenty-four hours, leaving only precession for the ἀπλανής. As we have seen, Boeckh attributed this to Philolaos, but without evidence. If he had thought of it, these difficulties would not have arisen.

[2] *Tim.* 39 a 5–b 2, especially the words τὰ τάχιστα περιιόντα ὑπὸ τῶν

Pythagoreans were singularly open to new ideas. At the same time, we must note that the theory is even more emphatically expressed by the Athenian Stranger in the *Laws*, who is in a special sense Plato himself. If we were to praise the runners who come in last in the race, we should not do what is pleasing to the competitors; and in the same way it cannot be pleasing to the gods when we suppose the slowest of the heavenly bodies to be the fastest. The passage undoubtedly conveys the impression that Plato is expounding a novel theory.[1]

153. We have still to consider a view, which Aristotle sometimes attributes to the Pythagoreans, that things were "like numbers." He does not appear to regard this as inconsistent with the doctrine that things *are* numbers, though it is hard to see how he could reconcile the two.[2] There is no doubt, however, that Aristoxenos represented the Pythagoreans as teaching that things were *like* numbers,[3] and there are other traces of an attempt to make out that this was the original doctrine. A letter was produced, purporting to be by Theano, the wife of Pythagoras, in which she says that she hears many of the Hellenes think Pythagoras said things were made *of* number, whereas

Things likenesses of numbers.

βραδυτέρων ἐφαίνετο καταλαμβάνοντα καταλαμβάνεσθαι ("they appear to be overtaken, though they overtake").

[1] Plato, *Laws*, 822 a 4 sqq. The Athenian says of the theory that he had not heard of it in his youth nor long before (821 e 3). If so, it can hardly have been taught by Philolaos, though it may have been by Archytas.

[2] Cf. especially *Met.* A, 6. 787 b 10 (R. P. 65 d). It is not quite the same thing when he says, as in A, 5. 985 b 23 sqq. (R. P. *ib.*), that they perceived many likenesses in things to numbers. That refers to the numerical analogies of Justice, Opportunity, etc.

[3] Aristoxenos *ap.* Stob. i. pr. 6 (p. 20), Πυθαγόρας . . . πάντα τὰ πράγματα ἀπεικάζων τοῖς ἀριθμοῖς.

he really said they were made *according to* number.[1] It is amusing to notice that this fourth-century theory had to be explained away in its turn later on, and Iamblichos actually tells us that it was Hippasos who said number was the exemplar of things.[2]

When this view is uppermost in his mind, Aristotle seems to find only a verbal difference between Plato and the Pythagoreans. The metaphor of "participation" was merely substituted for that of "imitation." This is not the place to discuss the meaning of Plato's so-called "theory of ideas"; but it must be pointed out that Aristotle's ascription of the doctrine of "imitation" to the Pythagoreans is abundantly justified by the *Phaedo*. The arguments for immortality given in the early part of that dialogue come from various sources. Those derived from the doctrine of Reminiscence, which has sometimes been supposed to be Pythagorean, are only known to the Pythagoreans by hearsay, and Simmias requires to have the whole psychology of the subject explained to him.[3] When, however, we come to the question what it is that our sensations remind us of, his attitude changes. The view that the equal itself is alone real, and that what we call equal things are imperfect imitations of it, is quite familiar to him.[4] He requires no proof of it, and is finally convinced of the immortality of the soul just because Sokrates makes him see that the theory of forms implies it.

It is also to be observed that Sokrates does not introduce the theory as a novelty. The reality of the

[1] Stob. *Ecl.* i. p. 125, 19 (R. P. 65 d).
[2] Iambl. *in Nicom.* p. 10, 20 (R. P. 56 c).
[3] Plato, *Phd.* 73 a sqq. [4] *Ibid.* 74 a sqq.

"ideas" is the sort of reality "we are always talking about," and they are explained in a peculiar vocabulary which is represented as that of a school. The technical terms are introduced by such formulas as "we say."[1] Whose theory is it? It is usually supposed to be Plato's own, though nowadays it is the fashion to call it his "early theory of ideas," and to say that he modified it profoundly in later life. But there are serious difficulties in this view. Plato is very careful to tell us that he was not present at the conversation recorded in the *Phaedo*. Did any philosopher ever propound a new theory of his own by representing it as already familiar to a number of distinguished living contemporaries? It is not easy to believe that. It would be rash, on the other hand, to ascribe the theory to Sokrates, and there seems nothing for it but to suppose that the doctrine of "forms" (*εἴδη*, *ἰδέαι*) originally took shape in Pythagorean circles, perhaps under Sokratic influence. There is nothing startling in this. It is a historical fact that Simmias and Kebes were not only Pythagoreans but disciples of Sokrates; for, by a happy chance, the good Xenophon has included them in his list of true Sokratics.[2] We have also sufficient ground for believing that the Megarians had adopted a like theory under similar influences, and Plato states expressly that Eukleides and Terpsion of

[1] Cf. especially the words *ὃ θρυλοῦμεν ἀεί* (76 d 8). The phrases *αὐτὸ ὃ ἔστιν*, *αὐτὸ καθ' αὑτό*, and the like are assumed to be familiar. "We" define reality by means of question and answer, in the course of which "we" give an account of its being (*ἧς λόγον δίδομεν τοῦ εἶναι*, 78 d 1, where *λόγον . . . τοῦ εἶναι* is equivalent to *λόγον τῆς οὐσίας*). When we have done this, "we" set the seal or stamp of *αὐτὸ ὃ ἔστιν* upon it (75 d 2). Technical terminology implies a school. As Diels puts it (*Elementum*, p. 20), it is in a school that "the simile concentrates into a metaphor, and the metaphor condenses into a term."

[2] Xen. *Mem.* i. 2, 48.

Megara were present at the conversation recorded in the *Phaedo*. There were, no doubt, more "friends of the ideas"[1] than we generally recognise. It is certain, in any case, that the use of the words εἴδη and ἰδέαι to express ultimate realities is pre-Platonic, and it seems most natural to regard it as of Pythagorean origin.[2]

We have really exceeded the limits of this work by tracing the history of Pythagoreanism down to a point where it becomes practically indistinguishable from the earliest form of Platonism; but it was necessary to do so in order to put the statements of our authorities in their true light. Aristoxenos is not likely to have been mistaken with regard to the opinions of the men he had known personally, and Aristotle's statements must have had some foundation. We must assume, then, a later form of Pythagoreanism which was closely akin to early Platonism. That, however, is not the form of it which concerns us here, and we shall see in the next chapter that the fifth-century doctrine was of the more primitive type already described.

[1] Plato, *Soph.* 248 a 4.

[2] See Diels, *Elementum*, pp. 16 sqq. Parmenides had already called the original Pythagorean "elements" μορφαί (§ 91), and Philistion called the "elements" of Empedokles ἰδέαι. If the ascription of this terminology to the Pythagoreans is correct, we may say that the Pythagorean "forms" developed into the atoms of Leukippos and Demokritos on the one hand (§ 174), and into the "ideas" of Plato on the other.

CHAPTER VIII

THE YOUNGER ELEATICS

154. THE systems we have just been studying were all fundamentally pluralist, and they were so because Parmenides had shown that, if we take a corporeal monism seriously, we must ascribe to reality a number of predicates which are inconsistent with our experience of a world which everywhere displays multiplicity, motion, and change (§ 97). The four "roots" of Empedokles and the innumerable "seeds" of Anaxagoras were both of them conscious attempts to solve the problem which Parmenides had raised (§§ 106, 127). There is no evidence, indeed, that the Pythagoreans were directly influenced by Parmenides, but it has been shown (§ 147) how the later form of their system was based on the theory of Empedokles. Now it was just this prevailing pluralism that Zeno criticised from the Eleatic standpoint; and his arguments were especially directed against Pythagoreanism. Melissos, too, criticises Pythagoreanism; but he tries to find a common ground with his adversaries by maintaining the old Ionian thesis that reality is infinite.

Relation to predecessors.

I. Zeno of Elea

Life. 155. According to Apollodoros,[1] Zeno flourished in Ol. LXXIX. (464-460 B.C.). This date is arrived at by making him forty years younger than his master Parmenides. We have seen already (§ 84) that the meeting of Parmenides and Zeno with the young Sokrates cannot well have occurred before 449 B.C., and Plato tells us that Zeno was at that time "nearly forty years old."[2] He must, then, have been born about 489 B.C., some twenty-five years after Parmenides. He was the son of Teleutagoras, and the statement of Apollodoros that he had been adopted by Parmenides is only a misunderstanding of an expression of Plato's *Sophist*.[3] He was, Plato further tells us,[4] tall and of a graceful appearance.

Like Parmenides and most other early philosophers, Zeno seems to have played a part in the politics of his native city. Strabo ascribes to him some share of the credit for the good government of Elea, and says that he was a Pythagorean.[5] This statement can easily be explained. Parmenides, we have seen, was originally a Pythagorean, and the school of Elea was no doubt popularly regarded as a mere branch of the larger society. We hear also that Zeno conspired against a tyrant, whose name is differently given, and the story

[1] Diog. ix. 29 (R. P. 130 a). Apollodoros is not expressly referred to for Zeno's date; but, as he is quoted for his father's name (ix. 25; R. P. 130), there can be no doubt that he is also the source of the *floruit*.

[2] Plato, *Parm.* 127 b (R. P. 111 d). The visit of Zeno to Athens is confirmed by Plut. *Per.* 4 (R. P. 130 e), where we are told that Perikles "heard" him as well as Anaxagoras. It is also alluded to in *Alc.* I. 119 a, where we are told that Pythodoros, son of Isolochos, and Kallias, son of Kalliades, each paid him 100 minae for instruction.

[3] Plato, *Soph.* 241 d (R. P. 130 a).

[4] Plato, *Parm.*, *loc. cit.*

[5] Strabo, vi. p. 252 (R. P. 111 c).

of his courage under torture is often repeated, though with varying details.[1]

156. Diogenes speaks of Zeno's "books," and Souidas gives some titles which probably come from the Alexandrian librarians through Hesychios of Miletos.[2] In the *Parmenides*, Plato makes Zeno say that the work by which he is best known was written in his youth and published against his will.[3] As he is supposed to be forty years old at the time of the dialogue, this must mean that the book was written before 460 B.C. (§ 84), and it is very possible that he wrote others after it. The most remarkable title which has come down to us is that of the *Interpretation of Empedokles*. It is not to be supposed, of course, that Zeno wrote a commentary on the Poem of Empedokles; but, as Diels has pointed out,[4] it is quite credible that he should have written an attack on it, which was afterwards called by that name. If he wrote a work against the "philosophers," that must mean the Pythagoreans, who, as we have seen, made use of the term in a sense of their own.[5] The *Disputations* and the *Treatise on Nature* may, or may not, be the same as the book described in Plato's *Parmenides*. Writings.

It is not likely that Zeno wrote dialogues, though certain references in Aristotle have been supposed to imply this. In the *Physics*[6] we hear of an argument of Zeno's, that any part of a heap of millet makes a

[1] Diog. ix. 26, 27, and the other passages referred to in R. P. 130 c.

[2] Diog. ix. 26 (R. P. 130); Suidas *s.v.* (R. P. 130 d).

[3] Plato, *Parm.* 128 d 6 (R. P. 130 d).

[4] *Berl. Sitzb.*, 1884, p. 359.

[5] See above, p. 321, n. 2. It hardly seems likely that a later writer would make Zeno argue πρὸς τοὺς φιλοσόφους, and the title given to the book at Alexandria must be based on something contained in it.

[6] Arist. *Phys.* H, 5. 250 a 20 (R. P. 131 a).

sound, and Simplicius illustrates this by quoting a passage from a dialogue between Zeno and Protagoras.[1] If our chronology is right, there is nothing impossible in the idea that the two men may have met; but it is most unlikely that Zeno should have made himself a personage in a dialogue of his own. That was a later fashion. In another place Aristotle refers to a passage where "the answerer and Zeno the questioner" occurred,[2] a reference which is most easily to be understood in the same way. Alkidamas seems to have written a dialogue in which Gorgias figured,[3] and the exposition of Zeno's arguments in dialogue form must always have been a tempting exercise. It appears also that Aristotle made Alexamenos the first writer of dialogues.[4]

Plato gives us a clear idea of what Zeno's youthful work was like. It contained more than one "discourse," and these discourses were subdivided into sections, each dealing with some one presupposition of his adversaries.[5] We owe the preservation of Zeno's arguments on the one and many to Simplicius.[6] Those

[1] Simpl. *Phys.* p. 1108, 18 (R. P. 131). If this is what Aristotle refers to, it is hardly safe to attribute the κεγχρίτης λόγος to Zeno himself. It is worth noting that the existence of this dialogue is another indication of Zeno's visit to Athens at an age when he could converse with Protagoras, which agrees very well with Plato's representation of the matter.

[2] Arist. *Soph. El.* 170 b 22 (R. P. 130 b). [3] Chap. V. p. 231, n. 5.

[4] Diog. iii. 48. It is certain that the authority whom Diogenes follows here took the statement of Aristotle to mean that Alexamenos was the first writer of prose dialogues.

[5] Plato, *Parm.* 127 d. Plato speaks of the first ὑπόθεσις of the first λόγος, which shows that the book was really divided into separate sections. Proclus (*in loc.*) says there were forty of these λόγοι altogether.

[6] Simplicius expressly says in one place (p. 140, 30; R. P. 133) that he is quoting κατὰ λέξιν. I now see no reason to doubt this, as the Academy would certainly have a copy of the work. If so, the fact that the fragments are not written in Ionic is another confirmation of Zeno's residence at Athens.

relating to motion have been preserved by Aristotle himself;[1] but, as usual, he has restated them in his own language.

157. Aristotle in his *Sophist*[2] called Zeno the inventor of dialectic, and this, no doubt, is substantially true, though the beginnings at least of that method of arguing were contemporary with the foundation of the Eleatic school. Plato[3] gives us a spirited account of the style and purpose of Zeno's book, which he puts into his own mouth :— Dialectic.

In reality, this writing is a sort of reinforcement for the argument of Parmenides against those who try to turn it into ridicule on the ground that, if reality is one, the argument becomes involved in many absurdities and contradictions. This writing argues against those who uphold a Many, and gives them back as good and better than they gave; its aim is to show that their assumption of multiplicity will be involved in still more absurdities than the assumption of unity, if it is sufficiently worked out.

The method of Zeno was, in fact, to take one of his adversaries' fundamental postulates and deduce from it two contradictory conclusions.[4] This is what Aristotle meant by calling him the inventor of dialectic, which is just the art of arguing, not from true premisses, but from premisses admitted by the other side. The

[1] Arist. *Phys.* Z, 9. 239 b 9 sqq.

[2] Cf. Diog. ix. 25 (R. P. 130).

[3] Plato, *Parm.* 128 c (R. P. 130 d).

[4] The technical terms used in Plato's *Parmenides* seem to be as old as Zeno himself. The ὑπόθεσις is the provisional assumption of the truth of a certain statement, and takes the form εἰ πολλά ἐστι or the like. The word does not mean the assumption of something as a foundation, but the setting before one's self of a statement as a problem to be solved (Ionic ὑποθέσθαι, Attic προθέσθαι). If the conclusions which necessarily follow from the ὑπόθεσις (τὰ συμβαίνοντα) are impossible, the ὑπόθεσις is "destroyed" (cf. Plato, *Rep.* 533 c 8, τὰς ὑποθέσεις ἀναιροῦσα). The author of the Περὶ ἀρχαίης ἰατρικῆς (c 1) knows the word ὑπόθεσις in a similar sense.

theory of Parmenides had led to conclusions which contradicted the evidence of the senses, and Zeno's object was not to bring fresh proofs of the theory itself, but simply to show that his opponents' view led to contradictions of a precisely similar nature.

Zeno and Pythagoreanism.

158. That Zeno's dialectic was mainly directed against the Pythagoreans is certainly suggested by Plato's statement, that it was addressed to the adversaries of Parmenides, who held that things were 'a many."[1] Zeller holds, indeed, that it was merely the popular form of the belief that things are many that Zeno set himself to confute;[2] but it is surely not true that ordinary people believe things to be "a many" in the sense required. Plato tells us that the premisses of Zeno's arguments were the beliefs of the adversaries of Parmenides, and the postulate from which all his contradictions are derived is the view that space, and therefore body, is made up of a number of discrete units, which is just the Pythagorean doctrine. Nor is it at all probable that Anaxagoras is aimed at.[3] We know from Plato that Zeno's book was the work of his youth.[4] Suppose even that it was written when he was thirty, that is to say, about 459 B.C., Anaxagoras had just taken up his abode at Athens at that time,[5] and it is very unlikely that Zeno had ever heard of him. There is, on the other hand, a great deal to be said for the view that Anaxagoras had read the work of Zeno, and that his emphatic adhesion to the doctrine

[1] The view that Zeno's arguments were directed against Pythagoreanism has been maintained in recent times by Tannery (*Science hellène*, pp. 249 sqq.), and Bäumker (*Das Problem der Materie*, pp. 60 sqq.).

[2] Zeller, p. 589 (Eng. trans. p. 612).

[3] This is the view of Stallbaum in his edition of the *Parmenides* (pp. 25 sqq.).

[4] *Parm., loc. cit.*

[5] Chap. VI. § 120.

of infinite divisibility was due to the criticism of his younger contemporary.[1]

It will be noted how much clearer the historical position of Zeno becomes if we follow Plato in assigning him to a somewhat later date than is usual. We have first Parmenides, then the pluralists, and then the criticism of Zeno. This, at any rate, seems to have been the view which Aristotle took of the historical development.[2]

159. The polemic of Zeno is clearly directed in the first instance against a certain view of the unit. Eudemos, in his *Physics*,[3] quoted from him the saying that "if any one could tell him what the one was, he would be able to say what things are." The commentary of Alexander on this, preserved by Simplicius,[4] is quite satisfactory. "As Eudemos relates," he says, "Zeno the disciple of Parmenides tried to show that it was impossible that things could be a many, seeing that there was no unit in things, whereas 'many' means a number of units." Here we have a clear reference to the Pythagorean view that everything may be reduced to a sum of units, which is what Zeno denied.[5] What is the unit?

[1] Cf. for instance Anaxagoras, fr. 3, with Zeno, fr. 2; and Anaxagoras, fr. 5, with Zeno, fr. 3.

[2] Arist. *Phys.* A, 3. 187 a 1 (R. P. 134 b). See below, § 173.

[3] Simpl. *Phys.* p. 138, 32 (R. P. 134 a).

[4] Simpl. *Phys.* p. 99, 13, *ὡς γὰρ ἱστορεῖ, φησὶν* ('Αλέξανδρος), *Εὔδημος, Ζήνων ὁ Παρμενίδου γνώριμος ἐπειρᾶτο δεικνύναι ὅτι μὴ οἷόν τε τὰ ὄντα πολλὰ εἶναι τῷ μηδὲν εἶναι ἐν τοῖς οὖσιν ἕν, τὰ δὲ πολλὰ πλῆθος εἶναι ἑνάδων.* This is the meaning of the statement that Zeno *ἀνῄρει τὸ ἕν*, which is not Alexander's (as implied in R. P. 134 a), but goes back to no less an authority than Eudemos. It is perfectly correct when read in connexion with the words *τὴν γὰρ στιγμὴν ὡς τὸ ἓν λέγει* (Simpl. *Phys.* p. 99, 11).

[5] It is quite in order that Mr. Bertrand Russell, from the standpoint of pluralism, should accept Zeno's arguments as "immeasurably subtle and profound" (*Principles of Mathematics*, p. 347). We know from Plato, however, that Zeno meant them as a *reductio ad absurdum* of pluralism.

The Fragments.

160. The fragments of Zeno himself also show that this was his line of argument. I give them according to the arrangement of Diels.

(1)

If the one had no magnitude, it would not even be. . . . But, if it is, each one must have a certain magnitude and a certain thickness, and must be at a certain distance from another, and the same may be said of what is in front of it; for it, too, will have magnitude, and something will be in front of it.[1] It is all the same to say this once and to say it always; for no such part of it will be the last, nor will one thing not be compared with another.[2] So, if things are a many, they must be both small and great, so small as not to have any magnitude at all, and so great as to be infinite. R. P. 134.

(2)

For if it were added to any other thing it would not make it any larger; for nothing can gain in magnitude by the addition of what has no magnitude, and thus it follows at once that what was added was nothing.[3] But if, when this is taken away from another thing, that thing is no less; and again, if, when it is added to another thing, that does not increase, it is plain that what was added was nothing, and what was taken away was nothing. R. P. 132.

(3)

If things are a many, they must be just as many as they are, and neither more nor less. Now, if they are as many as they are, they will be finite in number.

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[1] I formerly rendered "the same may be said of what surpasses it in smallness; for it too will have magnitude, and something will surpass it in smallness." This is Tannery's rendering, but I now agree with Diels in thinking that *ἀπέχειν* refers to *μέγεθος* and *προέχειν* to *πάχος*. Zeno is showing that the Pythagorean point has really three dimensions.

[2] Reading, with Diels and the MSS., *οὔτε ἕτερον πρὸς ἕτερον οὐκ ἔσται.* Gomperz's conjecture (adopted in R. P.) seems to me arbitrary.

[3] Zeller marks a lacuna here. Zeno must certainly have shown that the subtraction of a point does not make a thing less; but he may have done so before the beginning of our present fragment.

If things are a many, they will be infinite in number; for there will always be other things between them, and others again between these. And so things are infinite in number. R. P. 133.[1]

161. If we hold that the unit has no magnitude—and this is required by what Aristotle calls the argument from dichotomy,[2]—then everything must be infinitely small. Nothing made up of units without magnitude can itself have any magnitude. On the other hand, if we insist that the units of which things are built up are something and not nothing, we must hold that everything is infinitely great. The line is infinitely divisible; and, according to this view, it will be made up of an infinite number of units, each of which has some magnitude. The unit.

That this argument refers to points is proved by an instructive passage from Aristotle's *Metaphysics*.[3] We read there—

If the unit is indivisible, it will, according to the proposition of Zeno, be nothing. That which neither makes anything larger by its addition to it, nor smaller by its subtraction from it, is not, he says, a real thing at all; for clearly what is real must be a magnitude. And, if it is a magnitude, it is corporeal; for that is corporeal which is in every dimension. The other things, *i.e.* the plane and the line, if added in one way will make things larger, added in another they will produce no effect; but the point and the unit cannot make things larger in any way.

From all this it seems impossible to draw any other

[1] This is what Aristotle calls "the argument from dichotomy" (*Phys.* A, 3. 187 a 1; R. P. 134 b). If a line is made up of points, we ought to be able to answer the question, "How many points are there in a given line?" On the other hand, you can always divide a line or any part of it into two halves; so that, if a line is made up of points, there will always be more of them than any number you assign.

[2] See last note.

[3] Arist. *Met.* B, 4. 1001 b 7.

conclusion than that the "one" against which Zeno argued was the "one" of which a number constitute a "many," and that is just the Pythagorean unit.

Space. 162. Aristotle refers to an argument which seems to be directed against the Pythagorean doctrine of space,[1] and Simplicius quotes it in this form:[2]

> If there is space, it will be in something; for all that is is in something, and what is in something is in space. So space will be in space, and this goes on *ad infinitum*, therefore there is no space. R. P. 135.

What Zeno is really arguing against here is the attempt to distinguish space from the body that occupies it. If we insist that body must be *in* space, then we must go on to ask what space itself is in. This is a "reinforcement" of the Parmenidean denial of the void. Possibly the argument that everything must be "in" something, or must have something beyond it, had been used against the Parmenidean theory of a finite sphere with nothing outside it.

Motion. 163. Zeno's arguments on the subject of motion have been preserved by Aristotle himself. The system of Parmenides made all motion impossible, and his successors had been driven to abandon the monistic hypothesis in order to avoid this very consequence. Zeno does not bring any fresh proofs of the impossibility of motion; all he does is to show that a pluralist theory, such as the Pythagorean, is just as unable to explain it as was that of Parmenides. Looked at in this way, Zeno's arguments are no mere

[1] Arist. *Phys.* Δ, 1. 209 a 23; 3. 210 b 22 (R. P. 135 a).

[2] Simpl. *Phys.* p. 562, 3 (R. P. 135). The version of Eudemos is given in Simpl. *Phys.* p. 563, 26, *ἀξιοῖ γὰρ πᾶν τὸ ὂν ποῦ εἶναι· εἰ δὲ ὁ τόπος τῶν ὄντων, ποῦ ἂν εἴη; οὐκοῦν ἐν ἄλλῳ τόπῳ κἀκεῖνος δὴ ἐν ἄλλῳ καὶ οὕτως εἰς τὸ πρόσω.*

quibbles, but mark a great advance in the conception of quantity. They are as follows:—

(1) You cannot get to the end of a race-course.[1] You cannot traverse an infinite number of points in a finite time. You must traverse the half of any given distance before you traverse the whole, and the half of that again before you can traverse it. This goes on *ad infinitum*, so that there are an infinite number of points in any given space, and you cannot touch an infinite number one by one in a finite time.[2]

(2) Achilles will never overtake the tortoise. He must first reach the place from which the tortoise started. By that time the tortoise will have got some way ahead. Achilles must then make up that, and again the tortoise will be ahead. He is always coming nearer, but he never makes up to it.[3]

The "hypothesis" of the second argument is the same as that in the first, namely, that the line is a series of points; but the reasoning is complicated by the introduction of another moving object. The difference, accordingly, is not a half every time, but diminishes in a constant ratio. Again, the first argument shows that no moving object can ever traverse any distance at all, however fast it may move; the second emphasises the fact that, however slowly it moves, it will traverse an infinite distance.

(3) The arrow in flight is at rest. For, if everything is at rest when it occupies a space equal to itself, and what is in flight at any given moment always occupies a space equal to itself, it cannot move.[4]

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[1] Arist. *Top.* Θ, 8. 160 b 8, Ζήνωνος (λόγος), *ὅτι οὐκ ἐνδέχεται κινεῖσθαι οὐδὲ τὸ στάδιον διελθεῖν.*

[2] Arist. *Phys.* Z, 9. 239 b 11 (R. P. 136). Cf. Z, 2. 233 a 11; a 21 (R. P. 136 a).

[3] Arist. *Phys.* Z, 9. 239 b 14 (R. P. 137).

[4] *Phys.* Z, 9. 239 b 30 (R. P. 138); *ib.* 239 b 5 (R. P. 138 a). The latter passage is corrupt, though the meaning is plain. I have translated

Here a further complication is introduced. The moving object itself has length, and its successive positions are not points but lines. The successive moments in which it occupies them are still, however, points of time. It may help to make this clear if we remember that the flight of the arrow as represented by the cinematograph would be exactly of this nature.

(4) Half the time may be equal to double the time. Let us suppose three rows of bodies,[1] one of which (A) is at rest while the other two (B, C) are moving with equal velocity in opposite directions (Fig. 1). By the time they are all in the same part of the course, B will have passed twice as many of the bodies in C as in A (Fig. 2).

FIG. 1.

A.				●	●	●	●			
B	●	●	●	●	→					
C			←				●	●	●	●

FIG. 2.

A	●	●	●	●
B	●	●	●	●
C	●	●	●	●

Therefore the time which it takes to pass C is twice as long as the time it takes to pass A. But the time which B and C take to reach the position of A is the same. Therefore double the time is equal to the half.[2]

According to Aristotle, the paralogism here depends upon the assumption that an equal magnitude moving

Zeller's version of it *εἰ γάρ, φησίν, ἠρεμεῖ πᾶν ὅταν ᾖ κατὰ τὸ ἴσον, ἔστι δ' ἀεὶ τὸ φερόμενον ἐν τῷ νῦν κατὰ τὸ ἴσον, ἀκίνητον κ.τ.λ.* Of course *ἀεί* means "at any time," not "always," and *κατὰ τὸ ἴσον* is, literally, "on a level with a space equal (to itself)." For other readings, see Zeller, p. 598, n. 3; and Diels, *Vors.* p. 131, 44.

[1] The word is *ὄγκοι*; cf. Chap. VII. p. 338, n. 1. The name is very appropriate for the Pythagorean units, which Zeno had shown to have length, breadth, and thickness (fr. 1).

[2] Arist. *Phys.* Z, 9. 239 b 33 (R. P. 139). I have had to express the argument in my own way, as it is not fully given by any of the authorities. The figure is practically Alexander's (Simpl. *Phys.* p. 1016, 14), except that he represents the *ὄγκοι* by letters instead of dots. The conclusion is plainly stated by Aristotle (*loc. cit.*), *συμβαίνειν οἴεται ἴσον εἶναι χρόνον τῷ διπλασίῳ τὸν ἥμισυν*, and, however we explain the reasoning, it must be so represented as to lead to this conclusion.

with equal velocity must move for an equal time, whether the magnitude with which it is equal is at rest or in motion. That is certainly so, but we are not to suppose that this assumption is Zeno's own. The fourth argument is, in fact, related to the third just as the second is to the first. The Achilles adds a second moving point to the single moving point of the first argument; this argument adds a second moving line to the single moving line of the arrow in flight. The lines, however, are represented as a series of units, which is just how the Pythagoreans represented them; and it is quite true that, if lines are a sum of discrete units, and time is similarly a series of discrete moments, there is no other measure of motion possible than the number of units which each unit passes.

This argument, like the others, is intended to bring out the absurd conclusions which follow from the assumption that all quantity is discrete, and what Zeno has really done is to establish the conception of continuous quantity by a *reductio ad absurdum* of the other hypothesis. If we remember that Parmenides had asserted the one to be continuous (fr. 8, 25), we shall see how accurate is the account of Zeno's method which Plato puts into the mouth of Sokrates.

II. Melissos of Samos

164. In his Life of Perikles, Plutarch tells us, on the authority of Aristotle, that the philosopher Melissos, son of Ithagenes, was the Samian general who defeated the Athenian fleet in 441/0 B.C.;[1] and it Life.

[1] Plut. *Per.* 26 (R. P. 141 b), from Aristotle's Σαμίων πολιτεία.

was no doubt for this reason that Apollodoros fixed his *floruit* in Ol. LXXXIV. (444-41 B.C.).[1] Beyond this, we really know nothing about his life. He is said to have been, like Zeno, a disciple of Parmenides;[2] but, as he was a Samian, it is possible that he was originally a member of the Ionic school, and we shall see that certain features of his doctrine tend to bear out this view. On the other hand, he was certainly convinced by the Eleatic dialectic, and renounced the Ionic doctrine in so far as it was inconsistent with that. We note here the effect of the increased facility of intercourse between East and West, which was secured by the supremacy of Athens.

The Fragments.

165. The fragments which we have come from Simplicius, and are given, with the exception of the first, from the text of Diels.[3]

(1*a*) If nothing is, what can be said of it as of something real?[4]

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[1] Diog. ix. 24 (R. P. 141). It is possible, of course, that Apollodoros meant the first and not the fourth year of the Olympiad. That is his usual era, the foundation of Thourioi. But, on the whole, it is more likely that he meant the fourth; for the date of the *ναυαρχία* would be given with precision. See Jacoby, p. 270.

[2] Diog. ix. 24 (R. P. 141).

[3] It is no longer necessary to discuss the passages which used to appear as frs. 1-5 of Melissos, as it has been proved by A. Pabst that they are merely a paraphrase of the genuine fragments (*De Melissi Samii fragmentis* Bonn, 1889). Almost simultaneously I had independently come to the same conclusion (see the first edition, § 138). Zeller and Diels have both accepted Pabst's demonstration, and the supposed fragments have been relegated to the notes in the last edition of R. P. I still believe, however, that the fragment which I have numbered 1*a* is genuine. See next note.

[4] These words come from the beginning of the paraphrase which was so long mistaken for the actual words of Melissos (Simpl. *Phys.* p. 103, 18; R. P. 142 a), and Diels has accordingly removed them along with the rest. I believe them to be genuine because Simplicius, who had access to the complete work, introduces them by the words *ἄρχεται τοῦ συγγράμματος οὕτως*, and because they are thoroughly Eleatic in character. It is quite natural that the first words of the book should be prefixed to the paraphrase.

(1) What was was ever, and ever shall be. For, if it had come into being, it needs must have been nothing before it came into being. Now, if it were nothing, in no wise could anything have arisen out of nothing. R. P. 142.

(2) Since, then, it has not come into being, and since it is, was ever, and ever shall be, it has no beginning or end, but is without limit. For, if it had come into being, it would have had a beginning (for it would have begun to come into being at some time or other) and an end (for it would have ceased to come into being at some time or other); but, if it neither began nor ended, and ever was and ever shall be, it has no beginning or end; for it is not possible for anything to be ever without all being. R. P. 143.

(3) Further, just as it ever is, so it must ever be infinite in magnitude. R. P. 143.

(4) But nothing which has a beginning or end is either eternal or infinite. R. P. 143.

(5) If it were not one, it would be bounded by something else. R. P. 144 a.

(6) For if it is (infinite), it must be one; for if it were two, it could not be infinite; for then they would be bounded by one another.[1] R. P. 144.

(6*a*) (And, since it is one, it is alike throughout; for if it were unlike, it would be many and not one.)[2]

(7) So then it is eternal and infinite and one and all alike. And it cannot perish nor become greater, nor does it suffer pain or grief. For, if any of these things happened to it, it would no longer be one. For if it is altered, then the real must needs not be all alike, but what was before must pass away, and what was not must come into being. Now, if it changed by so much as a single hair in ten thousand years, it would all perish in the whole of time.

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[1] This fragment is quoted by Simpl. *de Caelo*, p. 557, 16 (R. P. 144). The insertion of the word "infinite" is justified by the paraphrase (R. P. 144 a) and by *M.X.G.* 974 a 11, *πᾶν δὲ ἄπειρον ὂν <ἓν> εἶναι· εἰ γὰρ δύο ἢ πλείω εἴη, πέρατ' ἂν εἶναι ταῦτα πρὸς ἄλληλα.*

[2] I have ventured to insert this, though the actual words are nowhere quoted, and it is not in Diels. It is represented in the paraphrase (R. P. 145 a) and in *M.X.G.* 974 a 13 (R. P. 144 a).

Further, it is not possible either that its order should b changed; for the order which it had before does not perisl nor does that which was not come into being. But, sinc nothing is either added to it or passes away or is altered, ho can any real thing have had its order changed? For if anythin became different, that would amount to a change in its orde

Nor does it suffer pain; for a thing in pain could not a be. For a thing in pain could not be ever, nor has it th same power as what is whole. Nor would it be alike, if were in pain; for it is only from the addition or subtraction c something that it could feel pain, and then it would no longe be alike. Nor could what is whole feel pain; for then wha was whole and what was real would pass away, and what wa not would come into being. And the same argument applie to grief as to pain.

Nor is anything empty. For what is empty is nothin What is nothing cannot be.

Nor does it move; for it has nowhere to betake itself to, bu is full. For if there were aught empty, it would betake itself t the empty. But, since there is naught empty, it has nowher to betake itself to.

And it cannot be dense and rare; for it is not possible fo what is rare to be as full as what is dense, but what is rare i at once emptier than what is dense.

This is the way in which we must distinguish between wha is full and what is not full. If a thing has room for anythin else, and takes it in, it is not full; but if it has no room fo anything and does not take it in, it is full.

Now, it must needs be full if there is naught empty, and it is full, it does not move. R. P. 145.

(8) This argument, then, is the greatest proof that it is on alone; but the following are proofs of it also. If there were many, these would have to be of the same kind as I say th the one is. For if there is earth and water, and air and iro and gold and fire, and if one thing is living and another dea and if things are black and white and all that men say the really are,—if that is so, and if we see and hear aright, eac one of these must be such as we first decided, and they cann be changed or altered, but each must be just as it is. But,

it is, we say that we see and hear and understand aright, and yet we believe that what is warm becomes cold, and what is cold warm; that what is hard turns soft, and what is soft hard; that what is living dies, and that things are born from what lives not; and that all those things are changed, and that what they were and what they are now are in no way alike. We think that iron, which is hard, is rubbed away by contact with the finger;[1] and so with gold and stone and everything which we fancy to be strong, and that earth and stone are made out of water; so that it turns out that we neither see nor know realities. Now these things do not agree with one another. We said that there were many things that were eternal and had forms and strength of their own, and yet we fancy that they all suffer alteration, and that they change from what we see each time. It is clear, then, that we did not see aright after all, nor are we right in believing that all these things are many. They would not change if they were real, but each thing would be just what we believed it to be; for nothing is stronger than true reality. But if it has changed, what was has passed away, and what was not is come into being. So then, if there were many things, they would have to be just of the same nature as the one. R. P. 147.

(9) Now, if it were to exist, it must needs be one; but if it is one, it cannot have body; for, if it had body it would have parts, and would no longer be one. R. P. 146.[2]

(10) If what is real is divided, it moves; but if it moves, it cannot be. R. P. 144 a.[3]

166. It has been pointed out that Melissos was perhaps not originally a member of the Eleatic school; but he certainly adopted all the views of Parmenides as to the true nature of reality with one remarkable exception. He appears to have opened his treatise with Theory of reality.

[1] Reading *ὁμουρέων* with Bergk. Diels keeps the MS. *ὁμοῦ ῥέων*; Zeller (p. 613, n. 1) conjectures *ὑπ' ἰοῦ ῥέων*.

[2] I read *εἰ μὲν οὖν εἴη* with E F for the *εἰ μὲν ὂν εἴη* of D. The *ἐὸν* which still stands in R. P. is a piece of local colour due to the editors. Diels also now reads *οὖν* (*Vors.* p. 149, 2).

[3] Diels now reads *ἀλλὰ* with E for the *ἅμα* of F, and attaches the word to the next sentence.

a reassertion of the Parmenidean "Nothing is not" (fr. 1*a*), and the arguments by which he supported this view are those with which we are already familiar (fr. 1). Reality, as with Parmenides, is eternal, an attribute which Melissos expressed in a way of his own. He argued that since everything that has come into being has a beginning and an end, everything that has not come into being has no beginning or end. Aristotle is very severe upon him for this simple conversion of a universal affirmative proposition;[1] but, of course his belief was not founded on that. His whole conception of reality made it necessary for him to regard it as eternal.[2] It would be a more serious matter if Aristotle were right in believing, as he seems to have done,[3] that Melissos inferred that what is must be infinite in space, because it had neither beginning nor end in time. This, however seems quite incredible. As we have the fragment which Aristotle interprets in this way (fr. 2), we are quite entitled to understand it for ourselves, and I cannot see anything to justify Aristotle's assumption

[1] Arist. *Phys.* A, 3. 186 a 7 (R. P. 143 a). Aristotle finds two flaws in the Eleatic reasoning: (1) *ψευδῆ λαμβάνουσιν*; (2) *ἀσυλλόγιστοί εἰσιν αὐτῶ οἱ λόγοι*. This is the first of these flaws. It is also mentioned in *Soph. El* 168 b 35 (R. P. *ib.*). So Eudemos *ap.* Simpl. *Phys.* p. 105, 24, *οὐ γάρ εἰ τὸ γενόμενον ἀρχὴν ἔχει, τὸ μὴ γενόμενον ἀρχὴν οὐκ ἔχει, μᾶλλον δ τὸ μὴ ἔχον ἀρχὴν οὐκ ἐγένετο.*

[2] The real reason is given in the paraphrase in Simpl. *Phys.* p. 103, 2 (R. P. 142 a), *συγχωρεῖται γὰρ καὶ τοῦτο ὑπὸ τῶν φυσικῶν*, though of course Melissos himself would not have put it in that way. He regarded himself as a *φυσικός* like the rest; but, from the time of Aristotle, it was a commonplace that the Eleatics were not *φυσικοί*, since they denied motion.

[3] This has been denied by Offner, "Zur Beurtheilung des Melissos" (*Arch.* iv. pp. 12 sqq.), but I now think he goes too far. Cf. especially *Top.* ix. 6, *ὡς ἄμφω ταὐτὰ ὄντα τῷ ἀρχὴν ἔχειν, τό τε γεγονὸς καὶ τὸ πεπερασμένον.* The same point is made in *Soph. El.* 167 b 13 and 181 a 27.

that the expression "without limit" means without limit in space.[1]

Reality spatially infinite.

167. Melissos did indeed differ from Parmenides in holding that reality was spatially as well as temporally infinite; but he gave an excellent reason for this belief, and had no need to support it by the extraordinary argument just alluded to. What he said was that, if it were limited, it would be limited by empty space. This we know from Aristotle himself,[2] and it marks a real advance upon Parmenides. He had thought it possible to regard reality as a finite sphere, but it would have been difficult for him to work out this view in detail. He would have had to say there was nothing outside the sphere; but no one knew better than he that there is no such thing as nothing. Melissos saw that you cannot imagine a finite sphere without regarding it as surrounded by an infinite empty space;[3] and as, in common with the rest of the school, he denied the void (fr. 7), he was forced to say reality was spatially infinite (fr. 3). It is possible that he was influenced in this by his association with the Ionic school.

From the infinity of reality, it follows that it must be one; for, if it were not one, it would be bounded by something else (fr. 5). And, being one, it must be homogeneous throughout (fr. 6*a*), for that is what we

[1] The words *ἀλλ' ἄπειρόν ἐστι* mean simply "but it is without limit," and this is simply a repetition of the statement that it has no beginning or end. The nature of the limit can only be determined by the context, and accordingly, when Melissos does introduce the subject of spatial infinity, he is careful to say *τὸ μέγεθος ἄπειρον* (fr. 3).

[2] Arist. *Gen. Corr.* i. 8. 325 a 14, *ἓν καὶ ἀκίνητον τὸ πᾶν εἶναί φασι καὶ ἄπειρον ἔνιοι· τὸ γὰρ πέρας περαίνειν ἂν πρὸς τὸ κενόν.* That this refers to Melissos has been proved by Zeller (p. 612, n. 2).

[3] Note the disagreement with Zeno (§ 162).

mean by one. Reality, then, is a single, homogeneous, corporeal *plenum*, stretching out to infinity in space, and going backwards and forwards to infinity in time.

Opposition to Ionians.

168. Eleaticism was always critical, and we are not without indications of the attitude taken up by Melissos towards contemporary systems. The flaw which he found in the Ionian theories was that they all assumed some want of homogeneity in the One, which is a real inconsistency. Further, they all allowed the possibility of change; but, if all things are one, change must be a form of coming into being and passing away. If you admit that a thing can change, you cannot maintain that it is eternal. Nor can the arrangement of the parts of reality alter, as Anaximander, for instance, had held; any such change necessarily involves a coming into being and passing away.

The next point made by Melissos is somewhat peculiar. Reality, he says, cannot feel sorrow or pain; for that is always due to the addition or subtraction of something, which is impossible. It is not easy to be sure what this refers to. Perhaps it is to the theory of Herakleitos with its Want and Surfeit, perhaps to something of which no record has been preserved.

Motion in general [1] and rarefaction and condensation in particular are impossible; for both imply the existence of empty space. Divisibility is excluded for the same reason. These are the same arguments as Parmenides employed.

[1] The view of Bäumker that Melissos admitted ἀντιπερίστασις or motion *in pleno* (*Jahrb. f. kl. Phil.*, 1886, p. 541; *Das Problem der Materie*, p. 59) depends upon some words of Simplicius (*Phys.* p. 104, 13), οὐχ ὅτι μὴ δυνατὸν διὰ πλήρους κινεῖσθαι, ὡς ἐπὶ τῶν σωμάτων λέγομεν κ.τ.λ. These words were formerly turned into Ionic and passed off as a fragment of Melissos. They are, however, part of Simplicius's own argument against Alexander, and have nothing to do with Melissos at all.

169. In nearly all accounts of the system of Melissos, we find it stated that he denied the corporeality of what is real,—an opinion which is supported by a reference to fr. 9, which is certainly quoted by Simplicius to prove this very point.[1] If, however, our general view as to the character of early Greek Philosophy is correct, the statement must seem incredible. And it will seem even more surprising when we find that in the *Metaphysics* Aristotle says that, while the unity of Parmenides seemed to be ideal, that of Melissos was material.[2] Now the fragment, as it stands in the MSS. of Simplicius,[3] puts a purely hypothetical case, and would most naturally be understood as a disproof of the existence of something on the ground that, if it existed, it would have to be both corporeal and one. This cannot refer to the Eleatic One, in which Melissos himself believed; and, as the argument is almost verbally the same as one of Zeno's,[4] it is natural to suppose that it also was directed against the Pythagorean assumption of ultimate units. The only possible objection is that Simplicius, who twice quotes the fragment, certainly took it in the sense usually given to it.[5] But it was very natural for him to make this mistake. "The One" was an expression that had two senses in the middle of the fifth century B.C.; it meant either the whole of

Opposition to Pythagoreans.

[1] See, however, Bäumker, *Das Problem der Materie*, pp. 57 sqq., who remarks that *ἐόν* (or *ὄν*) in fr. 9 must be the predicate, as it has no article. In his fifth edition (p. 611, n. 2) Zeller has adopted the view here taken. He rightly observes that the hypothetical form *εἰ μὲν ὂν εἴη* speaks for it, and that the subject to *εἴη* must be *ἕκαστον τῶν πολλῶν*, as with Zeno.

[2] *Met.* A, 5. 986 b 18 (R. P. 101).

[3] Brandis changed the *εἴη* to *ἔστι*, but there is no warrant for this.

[4] Cf. Zeno, fr. 1, especially the words *εἰ δὲ ἔστιν, ἀνάγκη ἕκαστον μέγεθός τι ἔχειν καὶ πάχος.*

[5] Simpl. *Phys.* pp. 87, 6, and 110, 1.

reality or the point as a spatial unit. To maintain it in the first sense, the Eleatics were obliged to disprove it in the second; and so it sometimes seemed that they were speaking of their own "One" when they really meant the other. We have seen that the very same difficulty was felt about Zeno's denial of the "one."[1]

Opposition to Anaxagoras.

170. The most remarkable fragment of Melissos is, perhaps, the last (fr. 8). It seems to be directed against Anaxagoras; at least the language used seems more applicable to him than to any one else. Anaxagoras had admitted (§ 137, *fin.*) that, so far as our perceptions go, they do not entirely agree with his theory, though he held this was due solely to their weakness. Melissos, taking advantage of this admission, urges that, if we give up the senses as the ultimate test of reality, we are not entitled to reject the Eleatic theory. With wonderful penetration he points out that if we are to say, with Anaxagoras, that things are a many, we are bound also to say that each one of them is such as the Eleatics declared the One to be. In other words, the only consistent pluralism is the atomic theory.

Melissos has long been unduly depreciated owing to the criticisms of Aristotle; but these, we have seen, are based mainly on a somewhat pedantic objection to the false conversion in the early part of the argument. Melissos knew nothing about the rules of conversion; and if he had, he could easily have made his reasoning formally correct without modifying his system. His greatness consisted in this, that not only was he the real systematiser of Eleaticism, but he was also able to see, before the pluralists saw it themselves, the only

[1] See above, § 159, p. 363, n. 4.

way in which the theory that things are a many could be consistently worked out.[1] It is significant that Polybos, the nephew of Hippokrates, reproaches those "sophists" who taught there was only one primary substance with "putting the doctrine of Melissos on its feet."[2]

[1] Bäumker, *op. cit.* p. 58, n. 3: "That Melissos was a weakling is a *fable convenue* that people repeat after Aristotle, who was unable to appreciate the Eleatics in general, and in particular misunderstood Melissos not inconsiderably."

[2] *Περὶ φύσιος ἀνθρώπου*, c. 1, *ἀλλ' ἔμοιγε δοκέουσιν οἱ τοιοῦτοι ἄνθρωποι αὐτοὶ ἑωυτοὺς καταβάλλειν ἐν τοῖσιν ὀνόμασι τῶν λόγων αὐτῶν ὑπὸ ἀσυνεσίης, τὸν δὲ Μελίσσου λόγον ὀρθοῦν.* The metaphors are taken from wrestling, and were current at this date (cf. the *καταβάλλοντες* of Protagoras). Plato implies a more generous appreciation of Melissos than Aristotle's. In *Theaet.* 180 e 2, he refers to the Eleatics as *Μέλισσοί τε καὶ Παρμενίδαι*, and in 183 e 4 he almost apologises for giving the preeminence to Parmenides.

CHAPTER IX

LEUKIPPOS OF MILETOS

eukippos and 'emokritos.

171. We have seen (§§ 31, 122) that the school of Miletos did not come to an end with Anaximenes, and it is a striking fact that the man who gave the most complete answer to the question first asked by Thales was a Milesian.[1] It is true that the very existence of Leukippos has been called in question. Epicurus said there never was such a philosopher, and the same thing has been maintained in quite recent times.[2] On the other hand, Aristotle and Theophrastos certainly made him the originator of the atomic theory, and it still seems possible to show they were right. Incidentally

[1] Theophrastos said he was an Eleate or a Milesian (R. P. 185), while Diogenes (ix. 30) says he was an Eleate or, according to some, an Abderite. These statements are exactly parallel to the discrepancies about the native cities of the Pythagoreans already noted (Chap. VII. p. 327, n. 5). Diogenes adds that, according to others, Leukippos was a Melian, which is a common confusion. Aetios (i. 7. 1) calls Diagoras of Melos a Milesian (cf. *Dox.* p. 14). Demokritos was called by some a Milesian (R. P. 186) for the same reason that Leukippos is called an Eleate. We may also compare the doubt as to whether Herodotos called himself a Halikarnassian or a Thourian.

[2] Diog. x. 13 (R. P. 185 b). The theory was revived by E. Rohde. For the literature of the controversy, see R. P. 185 b. Diels's refutation of Rohde has convinced most competent judges. Brieger's attempt to unsettle the question again (*Hermes*, xxxvi. pp. 166 sqq.) is only half-hearted, and quite unconvincing. As will be seen, however, I agree with his main contention that atomism comes after the systems of Empedokles and Anaxagoras.

we shall see how later writers came to ignore him, and thus made possible the sally of Epicurus.

The question is intimately bound up with that of the date of Demokritos, who said that he was a young man in the old age of Anaxagoras, a statement which makes it unlikely that he founded his school at Abdera before 420 B.C., the date given by Apollodoros for his *floruit*.[1] Now Theophrastos stated that Diogenes of Apollonia borrowed some of his views from Anaxagoras and some from Leukippos,[2] which can only mean that there were traces of the atomic theory in his work. Further, Apollonios is parodied in the *Clouds* of Aristophanes, which was produced in 423 B.C., from which it follows that the work of Leukippos must have become known considerably before that date. What that work was, Theophrastos also tells us. It was the *Great Diakosmos* usually attributed to Demokritos.[3] This means further that what were known later as the works of Demokritos were really the writings of the school of Abdera, and included, as was natural, the

[1] Diog. ix. 41 (R. P. 187). As Diels points out, the statement suggests that Anaxagoras was dead when Demokritos wrote. It is probable, too, that it was this which made Apollodoros fix the *floruit* of Demokritos just forty years after that of Anaxagoras (Jacoby, p. 290). We cannot make much of the other statement of Demokritos that he wrote the Μικρὸς διάκοσμος 750 years after the fall of Troy; for we cannot be sure what era he used (Jacoby, p. 292).

[2] Theophr. *ap.* Simpl. *Phys.* p. 25, 1 (R. P. 206 a).

[3] This was stated by Thrasylos in his list of the tetralogies in which he arranged the works of Demokritos, as he did those of Plato. He gives Tetr. iii. thus: (1) Μέγας διάκοσμος (ὃν οἱ περὶ Θεόφραστον Λευκίππου φασὶν εἶναι); (2) Μικρὸς διάκοσμος; (3) Κοσμογραφίη; (4) Περὶ τῶν πλανήτων. The two διάκοσμοι would only be distinguished as μέγας and μικρός when they came to be included in the same *corpus*. A quotation purporting to be from the Περὶ νοῦ of Leukippos is preserved in Stob. i. 160. The phrase ἐν τοῖς Λευκίππου καλουμένοις λόγοις in *M.X.G.* 980 a 8 seems to refer to Arist. *de Gen. Corr.* 325 a 24, Λεύκιππος δ' ἔχειν ᾠήθη λόγους κ.τ.λ., and would prove nothing in any case. Cf. Chap. II. p. 138, n. 4.

works of its founder. They formed, in fact, a *corpus* comparable to that which has come down to us under the name of Hippokrates, and it was no more possible to distinguish the authors of the different treatises in the one case than it is in the other. We need not hesitate, for all that, to believe that Aristotle and Theophrastos were better informed on this point than later writers, who naturally regarded the whole mass as equally the work of Demokritos.

Theophrastos found Leukippos described as an Eleate in some of his authorities, and, if we may trust analogy, that means he had settled at Elea.[1] It is possible that his emigration to the west was connected with the revolution at Miletos in 450-49 B.C.[2] In any case, Theophrastos says distinctly that he had been a member of the school of Parmenides, and the way in which he speaks suggests that the founder of that school was still at its head.[3] He may very well have been so, if we accept Plato's chronology.[4] Theophrastos also appears to have said that Leukippos "heard" Zeno, which is very credible. We shall see, at any rate, that the influence of Zeno on his thinking is unmistakable.[5]

[1] See above, p. 380, n. 1.

[2] The aristocrats had massacred the democrats, and were overthrown in their turn by the Athenians. Cf. [Xen.] Ἀθ. πολ. 3, 11. The date is fixed by *C.I.A.* i. 22 a.

[3] Theophr. *ap.* Simpl. *Phys.* p. 28, 4 (R. P. 185). Note the difference of case in κοινωνήσας Παρμενίδῃ τῆς φιλοσοφίας and κοινωνήσας τῆς Ἀναξιμένους φιλοσοφίας, which is the phrase used by Theophrastos of Anaxagoras (p. 293, n. 1). The dative seems to imply a personal relationship. It is quite inadmissible to render "was familiar with the doctrine of Parmenides," as is done in Gomperz, *Greek Thinkers*, vol. i. p. 345.

[4] See § 84.

[5] Cf. Diog. ix. 30, οὗτος ἤκουσε Ζήνωνος (R. P. 185 b); and Hipp. *Ref.* i. 12, 1, Λεύκιππος . . . Ζήνωνος ἑταῖρος. Diels conjectured that the name of Zeno had been dropped in the extract from Theophrastos preserved by Simplicius (*Dox.* 483 a 11).

The relations of Leukippos to Empedokles and Anaxagoras are more difficult to determine. It has become part of the case for the historical reality of Leukippos that there are traces of atomism in the systems of these men; but the case is strong enough without that assumption. Besides, it lands us in serious difficulties, not the least of which is that it would require us to regard Empedokles and Anaxagoras as mere eclectics like Diogenes of Apollonia.[1] The strongest argument for the view that Leukippos influenced Empedokles is that drawn from the doctrine of "pores"; but we have seen that this originated with Alkmaion, and it is therefore more probable that Leukippos derived it from Empedokles.[2] We have seen too that Zeno probably wrote against Empedokles, and we know that he influenced Leukippos.[3] Nor is it at all probable that Anaxagoras knew anything of the theory of Leukippos. It is true that he denied the existence of the void; but it does not follow that any one had already maintained that doctrine in the atomist sense. The early Pythagoreans had spoken of a void too, though they had confused it with atmospheric air; and the experiments of Anaxagoras

[1] This point is important, though the argument is weakened by Brieger's overstatement of it in *Hermes*, xxxvi. p. 183. He says that to assume such a reaction as Anaxagoreanism after the atomic system had once been discovered would be something unexampled in the history of Greek philosophy. Diogenes of Apollonia proves the contrary. The real point is that Empedokles and Anaxagoras were men of a different stamp. So far as Empedokles is concerned, Gomperz states the case rightly (*Greek Thinkers*, vol. i. p. 560).

[2] See above, Chap. V. p. 224, n. 1; and Brieger in *Hermes*, xxxvi. p. 171.

[3] Diels (formerly at least) maintained both these things. See above, p. 359, n. 4; and p. 382, n. 5. If, as seems probable (§ 158), Zeno wrote his book some time between 470 and 460 B.C., Leukippos can hardly have written his before 450 B.C., and even that is too late for him to have influenced Empedokles. It may well have been later still.

with the *klepsydra* and the inflated skins would only have had any point if they were directed against the Pythagorean theory.[1] If he had really wished to refute Leukippos, he would have had to use arguments of a very different kind.

Theophrastos on the atomic theory.

172. Theophrastos wrote of Leukippos as follows in the First Book of his *Opinions* :—

Leukippos of Elea or Miletos (for both accounts are given of him) had associated with Parmenides in philosophy. He did not, however, follow the same path in his explanation of things as Parmenides and Xenophanes did, but, as is believed, the very opposite (R. P. 185). They made the All one, immovable, uncreated, and finite, and did not even permit us to search for *what is not*; he assumed innumerable and ever-moving elements, namely, the atoms. And he made their forms infinite in number, since there was no reason why they should be of one kind rather than another, and because he saw that there was unceasing becoming and change in things. He held, further, that *what is* is no more real than *what is not*, and that both are alike causes of the things that come into being; for he laid down that the substance of the atoms was compact and full, and he called them *what is*, while they moved in the void which he called *what is not*, but affirmed to be just as real as *what is*. R. P. 194.

Leukippos and the Eleatics.

173. It will be observed that Theophrastos, while noting the affiliation of Leukippos to the Eleatic school, points out that his theory is, *prima facie*,[2] just the opposite of that maintained by Parmenides. Some

[1] See above, Chap. VI. § 131; and Chap. VII. § 145.

[2] The words ὡς δοκεῖ do not imply assent to the view introduced by them; indeed they are used, far more often than not, in reference to beliefs which the writer does not accept. The translation "methinks" in Gomperz, *Greek Thinkers*, vol. i. p. 345, is therefore most misleading, and there is no justification for Brieger's statement (*Hermes*, xxxvi. p. 165) that Theophrastos dissents from Aristotle's view as given in the passage about to be quoted. We should be saved from many errors if we accustomed ourselves to translate δοκεῖ by "is thought" or "is believed" instead of by "seems."

have been led by this to deny the Eleaticism of Leukippos altogether; but this denial is really based on the view that the system of Parmenides was "metaphysical," coupled with a great reluctance to admit that so scientific a hypothesis as the atomic theory can have had a "metaphysical" origin. It is really due to prejudice, and we must not suppose Theophrastos himself believed the two theories to be so far apart as they seem.[1] As this is really the most important point in the history of early Greek philosophy, and as, rightly understood, it furnishes the key to the whole development, it is worth while to transcribe a passage of Aristotle[2] which explains the historical connexion in a way that leaves nothing to be desired.

Leukippos and Demokritos have decided about all things practically by the same method and on the same theory, taking as their starting-point what naturally comes first. Some of the ancients had held that the real must necessarily be one and immovable; for, said they, empty space is not real, and motion would be impossible without empty space separated from matter; nor, further, could reality be a many, if there were nothing to separate things. And it makes no difference if any one holds that the All is not continuous, but discrete, with its parts in contact (*the Pythagorean view*), instead of holding that reality is many, not one, and that there is empty space. For, if it is divisible at every point there is no one, and therefore no many, and the Whole is empty (*Zeno*); while, if we say it is divisible in one place

[1] This prejudice is apparent all through Gomperz's *Greek Thinkers*, and seriously impairs the value of that fascinating, though somewhat imaginative work. It is amusing to notice that Brieger, from the same point of view, regards the custom of making Anaxagoras the last of the Presocratics as due to theological prepossessions (*Hermes*, xxxvi. p. 185). I am sorry that I cannot agree with either side; but the bitterness of the disputants bears witness to the fundamental importance of the questions raised by the early Greek philosophers.

[2] Arist. *de Gen. Corr.* A, 8. 324 b 35 (R. P. 193).

and not in another, this looks like an arbitrary fiction; for up to what point and for what reason will part of the Whole be in this state and be full, while the rest is discrete? And, on the same grounds, they further say that there can be no motion. In consequence of these reasonings, then, going beyond perception and overlooking it in the belief that we ought to follow the argument, they say that the All is one and immovable (*Parmenides*), and some of them that it is infinite (*Melissos*), for any limit would be bounded by empty space. This, then, is the opinion they expressed about the truth, and these are the reasons which led them to do so. Now, so far as arguments go, this conclusion does seem to follow; but, if we appeal to facts, to hold such a view looks like madness. No one who is mad is so far out of his senses that fire and ice appear to him to be one; it is only things that are right, and things that appear right from habit, in which madness makes some people see no difference.

Leukippos, however, thought he had a theory which was in harmony with sense-perception, and did not do away with coming into being and passing away, nor motion, nor the multiplicity of things. He made this concession to experience, while he conceded, on the other hand, to those who invented the One that motion was impossible without the void, that the void was not real, and that nothing of what was real was not real. "For," said he, "that which is strictly speaking real is an absolute *plenum*; but the *plenum* is not one. On the contrary, there are an infinite number of them, and they are invisible owing to the smallness of their bulk. They move in the void (for there is a void); and by their coming together they effect coming into being; by their separation, passing away."

It is true that in this passage Zeno and Melissos are not named, but the reference to them is unmistakable. The argument of Zeno against the Pythagoreans is clearly given; and Melissos was the only Eleatic who made reality infinite, a point which is distinctly mentioned. We are therefore justified by Aristotle's words

in explaining the genesis of Atomism and its relation to Eleaticism as follows. Zeno had shown that all pluralist systems yet known, and especially Pythagoreanism, were unable to stand before the arguments from infinite divisibility which he adduced. Melissos had used the same argument against Anaxagoras, and had added, by way of *reductio ad absurdum*, that, if there were many things, each one of them must be such as the Eleatics held the One to be. To this Leukippos answers, "Why not?" He admitted the force of Zeno's arguments by setting a limit to divisibility, and to each of the atoms which he thus arrived at he ascribed all the predicates of the Eleatic One; for Parmenides had shown that if *it is*, it must have these predicates somehow. The same view is implied in a passage of Aristotle's *Physics*.[1] "Some," we are there told, "surrendered to both arguments, to the first, the argument that all things are one, if the word *is* is used in one sense only (*Parmenides*), by affirming the reality of what is not; to the second, that based on dichotomy (*Zeno*), by introducing indivisible magnitudes." Finally, it is only by regarding the matter in this way that we can attach any meaning to another statement of Aristotle's to the effect that Leukippos and Demokritos, as well as the Pythagoreans, virtually make all things out of numbers.[2] Leukippos, in fact, gave the Pythagorean monads the character of the Parmenidean One.

174. We must observe that the atom is not mathe- **Atoms.**

[1] Arist. *Phys.* A, 3. 187 a 1 (R. P. 134 b).

[2] Arist. *de Caelo*, Γ, 4. 303 a 8, *τρόπον γάρ τινα καὶ οὗτοι (Λεύκιππος καὶ Δημόκριτος) πάντα τὰ ὄντα ποιοῦσιν ἀριθμοὺς καὶ ἐξ ἀριθμῶν*. This also serves to explain what Herakleides may have meant by attributing the theory of corporeal *ὄγκοι* to the Pythagorean Ekphantos of Syracuse (above, p. 338, n. 1).

matically indivisible, for it has magnitude; it is, however, physically indivisible, because, like the One of Parmenides, it contains in it no empty space.[1] Each atom has extension, and all the atoms are exactly alike in substance.[2] Therefore all differences in things must be accounted for either by the shape of the atoms or by their arrangement. It seems probable that the three ways in which differences arise, namely, shape, position, and arrangement, were already distinguished by Leukippos; for Aristotle mentions his name in connexion with them.[3] This explains, too, why the atoms are called "forms" or "figures," a way of speaking which seems to be of Pythagorean origin.[4] That they are also called *φύσις*[5] is quite intelligible if we remember what was said of that word in the Introduction (§ VII.). The differences in shape, order, and position just referred to account for the

[1] The Epicureans misunderstood this point, or misrepresented it in order to magnify their own originality (see Zeller, p. 857, n. 3; Eng. trans. ii. p. 225, n. 2).

[2] Arist. *de Caelo*, A, 7. 275 b 32, *τὴν δὲ φύσιν εἶναί φασιν αὐτῶν μίαν*; *Phys.* Γ, 4. 203 a 34, *αὐτῷ (Δημοκρίτῳ) τὸ κοινὸν σῶμα πάντων ἐστὶν ἀρχή*.

[3] Arist. *Met.* A, 4. 985 b 13 (R. P. 192); cf. *de Gen. Corr.* 315 b 6. As Diels suggests, the illustration from the letters of the alphabet is probably due to Demokritos. It shows, in any case, how the word *στοιχεῖον* came to be used later for "element." We must read, with Wilamowitz, *τὸ δὲ Ζ τοῦ Η θέσει* for *τὸ δὲ Ζ τοῦ Ν θέσει*, the older form of the letter Z being just an H laid upon its side (Diels, *Elementum*, p. 13, n. 1).

[4] Demokritos wrote a work, *Περὶ ἰδεῶν* (Sext. *Math.* vii. 137; R. P. 204), which Diels identifies with the *Περὶ τῶν διαφερόντων ῥυσμῶν* of Thrasylos, *Tetr.* v. 3. Theophrastos refers to Demokritos, *ἐν τοῖς περὶ τῶν εἰδῶν* (*de Sensibus*, § 51). Plut. *adv. Col.* 1111 a, *εἶναι δὲ πάντα τὰς ἀτόμους, ἰδέας ὑπ' αὐτοῦ καλουμένας* (so the MSS.: *ἰδίως*, Wyttenbach; <*ἢ*> *ἰδέας*, Diels). Arist. *Phys.* Γ, 4. 203 a 21, (*Δημόκριτος*) *ἐκ τῆς πανσπερμίας τῶν σχημάτων* (*ἄπειρα ποιεῖ τὰ στοιχεῖα*). Cf. *de Gen. Corr.* A, 2. 315 b 7 (R. P. 196).

[5] Arist. *Phys.* Θ, 9. 265 b 25; Simpl. *Phys.* p. 1318, 33, *ταῦτα γὰρ (τὰ ἄτομα σώματα) ἐκεῖνοι φύσιν ἐκάλουν*.

"opposites," the "elements" being regarded rather as aggregates of these (πανσπερμίαι), as by Anaxagoras.[1]

175. Leukippos affirmed the existence both of the Full and the Empty, terms which he may have borrowed from Melissos.[2] As we have seen, he had to assume the existence of empty space, which the Eleatics had denied, in order to make his explanation of the nature of body possible. Here again he is developing a Pythagorean view. The Pythagoreans had spoken of the void, which kept the units apart; but they had not distinguished it from atmospheric air (§ 53), which Empedokles had shown to be a corporeal substance (§ 107). Parmenides, indeed, had formed a clearer conception of space, but only to deny its reality. Leukippos started from this. He admitted, indeed, that space was not real, that is to say, corporeal; but he maintained that it existed all the same. He hardly, it is true, had words to express his discovery in; for the verb "to be" had hitherto been used by philosophers only of body. But he did his best to make his meaning clear by saying that "what is not" (in the old corporealist sense) "is" (in another sense) just as much as "what is." The void is as real as body. The void.

It is a curious fact that the Atomists, who are commonly regarded as the great materialists of antiquity, were actually the first to say distinctly that a thing might be real without being a body.

176. It might seem a hopeless task to disentangle the cosmology of Leukippos from that of Demokritos, with which it is generally identified; but that very fact Cosmology.

[1] Simpl. *Phys.* p. 36, 1 (Diels, *Vors.* p. 346), and R. P. 196 a.
[2] Arist. *Met.* A, 4. 985 b 4 (R. P. 192). Cf. Melissos, fr. 7 *sub fin.*

affords an invaluable clue. So far as we know, no one after Theophrastos was able to distinguish the doctrines of the two men, and it follows from this that all definite statements about Leukippos in later writers must, in the long run, go back to him. If we follow this up, we shall be able to give a fairly clear account of the system, and we shall even come across some views which are peculiar to Leukippos and were not adopted by Demokritos.[1]

We shall start from the fuller of the two doxographies in Diogenes, which comes from an epitome of Theophrastos.[2] It is as follows:—

He says that the All is infinite, and that it is part full, and part empty. These (the full and the empty), he says, are the elements. From them arise innumerable worlds and are resolved into them. The worlds come into being thus. There were borne along by "abscision from the infinite" many bodies of all sorts of figures "into a mighty void," and they being gathered together produce a single vortex. In it, as they came into collision with one another and were whirled round in all manner of ways, those which were alike were separated apart and came to their likes. But, as they were no longer able to revolve in equilibrium owing to their multitude, those of them that were fine went out to the external void, as if passed through a sieve; the rest stayed together, and becoming entangled with one another, ran down together, and made a first spherical structure. This was in substance like a membrane or skin containing in itself all kinds of bodies. And, as these bodies were borne round in a vortex, in virtue of the resistance of the middle, the surrounding membrane became thin, as the contiguous bodies kept

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[1] Cf. Zeller, "Zu Leukippus" (*Arch.* xv. p. 138).

[2] Diog. ix. 31 sqq. (R. P. 197, 197 c). This passage deals expressly with Leukippos, not with Demokritos or even "Leukippos and Demokritos." For the distinction between the "summary" and "detailed" doxographies in Diogenes, see Appendix, § 15.

flowing together from contact with the vortex. And in this way the earth came into being, those things which had been borne towards the middle abiding there. Moreover, the containing membrane was increased by the further separating out of bodies from outside; and, being itself carried round in a vortex, it further got possession of all with which it had come in contact. Some of these becoming entangled, produce a structure, which was at first moist and muddy; but, when they had been dried and were revolving along with the vortex of the whole, they were then ignited and produced the substance of the heavenly bodies. The circle of the sun is the outermost, that of the moon is nearest to the earth, and those of the others are between these. And all the heavenly bodies are ignited because of the swiftness of their motion; while the sun is also ignited by the stars. But the moon only receives a small portion of fire. The sun and the moon are eclipsed . . . (And the obliquity of the zodiac is produced) by the earth being inclined towards the south; and the northern parts of it have constant snow and are cold and frozen. And the sun is eclipsed rarely, and the moon continually, because their circles are unequal. And just as there are comings into being of the world, so there are growths and decays and passings away in virtue of a certain necessity, of the nature of which he gives no clear account.

As it comes substantially from Theophrastos, this passage is to be regarded as good evidence for the cosmology of Leukippos, and it is confirmed in an interesting way by certain Epicurean extracts from the *Great Diakosmos*.[1] These, however, as is natural, give a specially Epicurean turn to some of the doctrines, and must therefore be used with caution.

Relation to Ionic cosmology.

177. The general impression which we get from the cosmology of Leukippos is that he either ignored

[1] These are to be found in Aet. i. 4 (*Dox.* p. 289; *Vors.* p. 347; Usener, *Epicurea*, fr. 308). Epicurus himself in the second epistle (Diog. x. 88; Usener, p. 37, 7) quotes the phrase ἀποτομὴν ἔχουσα ἀπὸ τοῦ ἀπείρου.

or had never heard of the great advance in the general view of the world which was due to the later Pythagoreans. He is as reactionary in his detailed cosmology as he was daring in his general physical theory. We seem to be reading once more of the speculations of Anaximenes or even of Anaximander, though there are traces of Empedokles and Anaxagoras too. The explanation is not hard to see. Leukippos would not learn a cosmology from his Eleatic teachers; and, even when he found it possible to construct one without giving up the Parmenidean view of reality, he was necessarily thrown back upon the older systems of Ionia. The result was unfortunate. The astronomy of Demokritos, so far as we know it, was still of this childish character. There is no reason to doubt the statement of Seneca that he did not venture to say how many planets there were.[1]

This, I take it, is what gives plausibility to Gomperz's statement that Atomism was "the ripe fruit on the tree of the old Ionic doctrine of matter which had been tended by the Ionian physiologists."[2] The detailed cosmology was certainly such a fruit, and it was possibly over-ripe; but the atomic theory proper, in which the real greatness of Leukippos comes out, was wholly Eleatic in its origin. Nevertheless, it will repay us to examine the cosmology too; for such an examination will serve better than anything else to bring out the true nature of the historical development of which it was the outcome.

The eternal motion.

178. Leukippos represented the atoms as having been always in motion. Aristotle puts this in his own

[1] Seneca, *Q. Nat.* vii. 3.
[2] Gomperz, *Greek Thinkers*, vol. i. p. 323.

way. The atomists, he says, "indolently" left it unexplained what was the source of motion, and they did not say what sort of motion it was. In other words, they did not decide whether it was a "natural motion" or one impressed on them "contrary to their nature."[1] He even went so far as to say that they made it "spontaneous," a remark which has given rise to the erroneous view that they held it was due to chance.[2] Aristotle does not say that, however; but only that the atomists did not explain the motion of the atoms in any of the ways in which he himself explained the motion of the elements. They neither ascribed to them a natural motion like the circular motion of the heavens and the rectilinear motion of the four elements in the sublunary region, nor did they give them a forced motion contrary to their own nature, like the upward motion which may be given to the heavy elements and the downward which may be given to the light. The only fragment of Leukippos which has survived is an express denial of chance. "Naught happens for nothing," he said, "but everything from a ground and of necessity."[3]

If we put the matter historically, all this means that Leukippos did not, like Empedokles and Anaxagoras, find it necessary to assume a force to originate motion. He had no need of Love and Strife or Mind, and the reason is clear. Though Empedokles and Anaxagoras

[1] Arist. *Phys.* Θ, 1. 252 a 32 (R. P. 195 a); *de Caelo*, Γ, 2. 300 b 8 (R. P. 195); *Met.* A, 4. 985 b 19 (R. P. *ib.*).

[2] Arist. *Phys.* B, 4. 196 a 24 (R. P. 195 d). Cicero, *de nat. D.* i. 66 (R. P. *ib.*). The latter passage is the source of the phrase "fortuitous concourse" (*concurrere* = *συντρέχειν*).

[3] Aet. i. 25, 4 (*Dox.* p. 321), *Λεύκιππος πάντα κατ' ἀνάγκην, τὴν δ' αὐτὴν ὑπάρχειν εἱμαρμένην. λέγει γὰρ ἐν τῷ Περὶ νοῦ· Οὐδὲν χρῆμα μάτην γίγνεται, ἀλλὰ πάντα ἐκ λόγου τε καὶ ὑπ' ἀνάγκης.*

had tried to explain multiplicity and motion, they had not broken so radically as Leukippos did with the Parmenidean One. Both of them started with a condition of matter in which the "roots" or "seeds" were mixed so as to be "all together," and they therefore required something to break up this unity. Leukippos, who started with an infinite number of Parmenidean "Ones," so to speak, required no external agency to separate them. What he had to do was just the opposite. He had to give an explanation of their coming together, and there was nothing so far to prevent his return to the old and natural idea that motion does not require any explanation at all.[1]

This, then, is what seems to follow from the criticisms of Aristotle and from the nature of the case; but it will be observed that it is not consistent with Zeller's opinion that the original motion of the atoms is a fall through infinite space, as in the system of Epicurus. Zeller's view depends, of course, on the further belief that the atoms have weight, and that weight is the tendency of bodies to fall, so we must go on to consider whether and in what sense weight is a property of the atoms.

The weight of the atoms.

179. As is well known, Epicurus held that the atoms were naturally heavy, and therefore fell continually in the infinite void. The school tradition is, however, that the "natural weight" of the atoms was an addition made by Epicurus himself to the original atomic system. Demokritos, we are told, assigned two properties to atoms, magnitude and form, to which Epicurus added a third, weight.[2] On the other hand,

[1] Introd. § VIII.

[2] Aet. i. 3, 18 (of Epicurus), *συμβεβηκέναι δὲ τοῖς σώμασι τρία ταῦτα, σχῆμα, μέγεθος, βάρος. Δημόκριτος μὲν γὰρ ἔλεγε δύο, μέγεθός τε καὶ*

Aristotle distinctly says in one place that Demokritos held the atoms were heavier "in proportion to their excess," and this seems to be explained by the statement of Theophrastos that, according to him, weight depended on magnitude.[1] It will be observed that, even so, it is not represented as a primary property of the atoms in the same sense as magnitude.

It is impossible to solve this apparent contradiction without referring briefly to the history of Greek ideas about weight. It is clear that lightness and weight would be among the very first properties of body to be distinctly recognised as such. The necessity of lifting burdens must very soon have led men to distinguish them, though no doubt in some primitive and more or less animistic form. Both weight and lightness would be thought of as *things* that were *in* bodies. Now it is a remarkable feature of early Greek philosophy that from the first it was able to shake itself free from this idea. Weight is never spoken of as a "thing" as, for instance, warmth and cold are; and, so far as we can see, not one of the thinkers we

σχῆμα, ὁ δὲ Ἐπίκουρος τούτοις καὶ τρίτον βάρος προσέθηκεν· ἀνάγκη γάρ, φησί, κινεῖσθαι τὰ σώματα τῇ τοῦ βάρους πληγῇ· ἐπεὶ ("or else") οὐ κινηθήσεται; *ib.* 12, 6, Δημόκριτος τὰ πρῶτά φησι σώματα, ταῦτα δ' ἦν τὰ ναστά, βάρος μὲν οὐκ ἔχειν, κινεῖσθαι δὲ κατ' ἀλληλοτυπίαν ἐν τῷ ἀπείρῳ. Cic. *de fato*, 20, "vim motus habebant (atomi) a Democrito impulsionis quam plagam ille appellat, a te, Epicure, gravitatis et ponderis." These passages represent the Epicurean school tradition, which would hardly venture to misrepresent Demokritos on so important a point. His works were still accessible. It is confirmed by the Academic tradition in *de Fin.* i. 17 that Demokritos taught the atoms moved "in infinito inani, in quo nihil nec summum nec infimum nec medium nec extremum sit." This doctrine, we are told, was "depraved" by Epicurus.

[1] Arist. *de Gen. Corr.* 326 a 9, καίτοι βαρύτερόν γε κατὰ τὴν ὑπεροχήν φησιν εἶναι Δημόκριτος ἕκαστον τῶν ἀδιαιρέτων. I cannot believe this means anything else than what Theophrastos says in his fragment on sensation, § 61 (R. P. 199), βαρὺ μὲν οὖν καὶ κοῦφον τῷ μεγέθει διαιρεῖ Δημόκριτος.

have studied hitherto thought it necessary to give any explanation of it at all, or even to say anything about it.[1] The motions and resistances which popular theory ascribes to weight are all explained in some other way. Aristotle distinctly declares that none of his predecessors had said anything of absolute weight and lightness. They had only treated of the relatively light and heavy.[2]

This way of regarding the popular notions of weight and lightness is clearly formulated for the first time in Plato's *Timaeus*.[3] There is no such thing in the world, we are told there, as "up" or "down." The middle of the world is not "down" but "just in the middle," and there is no reason why any point in the circumference should be said to be "above" or "below" another. It is really the tendency of bodies towards their kin that makes us call a falling body heavy and the place to which it falls "below." Here Plato is really giving the view which was taken more or less consciously by his predecessors, and it is not till the time of Aristotle that it is questioned.[4] For reasons which do not concern us here, he definitely identified the circumference of the heavens with "up" and the middle of the world

[1] In Aet. i. 12, where the *placita* regarding the heavy and light are given, no philosopher earlier than Plato is referred to. Parmenides (fr. 8, 59) speaks of the dark element as ἐμβριθές. I do not think that there is any other place where weight is even mentioned in the fragments of the early philosophers.

[2] Arist. *de Caelo*, 308 a 9, περὶ μὲν οὖν τῶν ἁπλῶς λεγομένων (βαρέων καὶ κούφων) οὐδὲν εἴρηται παρὰ τῶν πρότερον.

[3] Plato, *Tim.* 61 c 3 sqq.

[4] Zeller says (p. 876) that in antiquity no one ever understood by weight anything else than the property of bodies in virtue of which they move downwards; except that in such systems as represent all forms of matter as contained in a sphere, "above" is identified with the circumference and "below" with the centre. As to that, I can only say that no such theory of weight is to be found in the fragments of the early philosophers or is anywhere ascribed to them, while Plato expressly denies it.

with "down," and equipped the four elements with natural weight and lightness that they might perform their rectilinear motions between them. As, however, Aristotle believed there was only one world, and as he did not ascribe weight to the heavens proper, the effect of this reactionary theory upon his cosmical system was not great; it was only when Epicurus tried to combine it with the infinite void that its true character emerged. It seems to me that the nightmare of Epicurean atomism can only be explained on the assumption that an Aristotelian doctrine was violently adapted to a theory which really excluded it.[1] It is totally unlike anything we meet with in earlier days.

This brief historical survey suggests at once that it is only in the vortex that the atoms acquire weight and lightness,[2] which are, after all, only popular names for facts which can be further analysed. We are told that Leukippos held that one effect of the vortex was that like atoms were brought together with their likes.[3] In this way of speaking we seem to see the influence of Empedokles, though the "likeness" is of another kind. It is the finer atoms that are forced to the circumference, while the larger tend to the centre. We

[1] The Aristotelian criticisms which may have affected Epicurus are such as we find in *de Caelo*, 275 b 29 sqq. Aristotle there argues that, as Leukippos and Demokritos made the φύσις of the atoms one, they were bound to give them a single motion. That is just what Epicurus did, but Aristotle's argument implies that Leukippos and Demokritos did not. Though he gave the atoms weight, Epicurus could not accept Aristotle's view that some bodies are naturally light. The appearance of lightness is due to ἔκθλιψις, the squeezing out of the smaller atoms by the larger.

[2] In dealing with Empedokles, Aristotle expressly makes this distinction. Cf. *de Caelo*, B, 13, especially 295 a 32 sqq., where he points out that Empedokles does not account for the weight of bodies on the earth (οὐ γὰρ ἥ γε δίνη πλησιάζει πρὸς ἡμᾶς), nor for the weight of bodies before the vortex arose (πρὶν γενέσθαι τὴν δίνην).

[3] Diog., *loc. cit.* (p. 390).

may express that by saying that the larger are heavy and the smaller light, and this will amply account for everything Aristotle and Theophrastos say; for there is no passage where the atoms outside the vortex are distinctly said to be heavy or light.[1]

There is a striking confirmation of the view just given in the atomist cosmology quoted above.[2] We are told there that the separation of the larger and smaller atoms was due to the fact that they were "no longer able to revolve in equilibrium owing to their number," which implies that they had previously been in a state of "equilibrium" or "equipoise." Now the word *ἰσορροπία* has no necessary implication of weight in Greek. A *ῥοπή* is a mere leaning or inclination in a certain direction, which may be caused by weight or anything else. The state of *ἰσορροπία* is therefore that in which the tendency in one direction is exactly equal to the tendency in any other, and such a state is more naturally described as the absence of weight than as the presence of opposite weights neutralising one another. That way of looking at it may be useful from the point of view of later science, but it is not safe to attribute it to the thinkers of the fifth century B.C.

If we no longer regard the "eternal motion" of the premundane and extramundane atoms as due to their weight, there is no reason for describing it as a fall. None of our authorities do as a matter of fact so describe it, nor do they tell us in any way what it was. It is safest to say that it is simply a confused motion this

[1] This seems to be in the main the view of Dyroff, *Demokritstudien* (1899), pp. 31 sqq., though I should not say that lightness and weight only arose in connexion with the atoms of the *earth* (p. 35). If we substitute "world" for "earth," we shall be nearer the truth.

[2] See above, p. 390.

way and that.[1] It is possible that the comparison of the motion of the atoms of the soul to that of the motes in a sunbeam coming through a window, which Aristotle attributes to Demokritos,[2] is really intended as an illustration of the original motion of the atoms still surviving in the soul. The fact that it is also a Pythagorean comparison[3] in no way tells against this; for we have seen that there is a real connexion between the Pythagorean monads and the atoms. It is also significant that the point of the comparison appears to have been the fact that the motes in the sunbeam move even when there is no wind, so that it would be a very apt illustration indeed of the motion inherent in the atoms apart from the secondary motions produced by impact and collision. That, however, is problematical; it only serves to suggest the sort of motion which it is natural to suppose that Leukippos gave his atoms.

180. But what are we to say of the vortex itself **The vortex.** which produces these effects? Gomperz observes that they seem to be "the precise contrary of what they should have been by the laws of physics"; for, "as every centrifugal machine would show, it is the heaviest

[1] This view was independently advocated by Brieger (*Die Urbewegung der Atome und die Weltentstehung bei Leucipp und Demokrit*, 1884) and Liepmann (*Die Mechanik der Leucipp-Demokritschen Atome*, 1885), both of whom unnecessarily weakened their position by admitting that weight is an original property of the atoms. On the other hand, Brieger denies that the weight of the atoms is the cause of their original motion, while Liepmann says that before and outside the vortex there is only a latent weight, a *Pseudoschwere*, which only comes into operation in the world. It is surely simpler to say that this weight, since it produces no effect, does not yet exist. Zeller rightly argues against Brieger and Liepmann that, if the atoms have weight, they must fall; but, so far as I can see, nothing he says tells against their theory as I have restated it. Gomperz adopts the Brieger-Liepmann explanation. See also Lortzing, *Jahresber.*, 1903, pp. 136 sqq.

[2] Arist. *de An.* A, 2. 403 b 28 sqq. (R. P. 200).

[3] *Ibid.* A, 2. 404 a 17 (R. P. 86 a).

substances which are hurled to the greatest distance."[1] Are we to suppose that Leukippos was ignorant of this fact, which was known to Anaxagoras, though Gomperz is wrong in supposing there is any reason to believe that Anaximander took account of it?[2] Now we know from Aristotle that all those who accounted for the earth being in the centre of the world by means of a vortex appealed to the analogy of eddies in wind or water,[3] and Gomperz supposes that the whole theory was an erroneous generalisation of this observation. If we look at the matter more closely, we can see, I think, that there is no error at all.

We must remember that all the parts of the vortex are in contact, and that it is just this contact (*ἐπίψαυσις*) by which the motion of the outermost parts is communicated to those within them. The larger bodies are more able to resist this communicated motion than the smaller, and in this way they make their way to the centre where the motion is least, and force the smaller bodies out. This resistance is surely just the *ἀντέρεισις τοῦ μέσου* which is mentioned in the doxography of Leukippos,[4] and it is quite in accordance with this that, on the atomist theory, the nearer a heavenly body is to the centre, the slower is its revolution.[5] There is no question of "centrifugal

[1] Gomperz, *Greek Thinkers*, i. p. 339.

[2] For Empedokles, see Chap. V. p. 274; Anaxagoras, see Chap. VI. p. 312; and for Anaximander, Chap. I. p. 69, n. 1.

[3] Arist. *de Caelo*, B, 13. 295 a 10, *ταύτην γὰρ τὴν αἰτίαν* (sc. *τὴν δίνησιν*) *πάντες λέγουσιν ἐκ τῶν ἐν τοῖς ὑγροῖς καὶ περὶ τὸν ἀέρα συμβαινόντων· ἐν τούτοις γὰρ ἀεὶ φέρεται τὰ μείζω καὶ τὰ βαρύτερα πρὸς τὸ μέσον τῆς δίνης.*

[4] Diog. ix. 32. Cf. especially the phrases *ὧν κατὰ τὴν τοῦ μέσου ἀντέρεισιν περιδινουμένων, συμμενόντων ἀεὶ τῶν συνεχῶν κατ' ἐπίψαυσιν τῆς δίνης*, and *συμμενόντων τῶν ἐνεχθέντων ἐπὶ τὸ μέσον.*

[5] Cf. Lucr. v. 621 sqq.

force" at all, and the analogy of eddies in air and water is quite satisfactory.

The earth and the heavenly bodies.

181. When we come to details, the reactionary character of the atomist cosmology is very manifest. The earth was shaped like a tambourine, and floated on the air.[1] It was inclined towards the south because the heat of that region made the air thinner, while the ice and cold of the north made it denser and more able to support the earth.[2] This accounts for the obliquity of the zodiac. Like Anaximander (§ 19), Leukippos held that the sun was further away than the stars, though he also held that these were further away than the moon.[3] This certainly suggests that he made no clear distinction between the planets and the fixed stars. He does, however, appear to have known the theory of eclipses as given by Anaxagoras.[4] Such other pieces of information as have come down to us are mainly of interest as showing that, in some important respects, the doctrine of Leukippos was not the same as that taught afterwards by Demokritos.[5]

Perception.

182. Aetios expressly attributes to Leukippos the

[1] Aet. iii. 3, 10, quoted above, p. 83, n. 2.

[2] Aet. iii. 12, 1, *Λεύκιππος παρεκπεσεῖν τὴν γῆν εἰς τὰ μεσημβρινὰ μέρη διὰ τὴν ἐν τοῖς μεσημβρινοῖς ἀραιότητα, ἅτε δὴ πεπηγότων τῶν βορείων διὰ τὸ κατεψῦχθαι τοῖς κρυμοῖς, τῶν δὲ ἀντιθέτων πεπυρωμένων.*

[3] Diog. ix. 33, *εἶναι δὲ τὸν τοῦ ἡλίου κύκλον ἐξώτατον, τὸν δὲ τῆς σελήνης προσγειότατον, <τοὺς δὲ> τῶν ἄλλων μεταξὺ τούτων.*

[4] From Diog., *loc. cit.* (*supra*, p. 391), it appears that he dealt with the question of the greater frequency of lunar as compared with solar eclipses. It seems to have been this which led him to make the circle of the moon smaller than that of the stars.

[5] Diels pointed out that Leukippos's explanation of thunder (*πυρὸς ἐναποληφθέντος νέφεσι παχυτάτοις ἔκπτωσιν ἰσχυρὰν βροντὴν ἀποτελεῖν ἀποφαίνεται*, Aet. iii. 3, 10) is quite different from that of Demokritos (*βροντὴν . . . ἐκ συγκρίματος ἀνωμάλου τὸ περιειληφὸς αὐτὸ νέφος πρὸς τὴν κάτω φορὰν ἐκβιαζομένου*, *ib.* 11). The explanation given by Leukippos is derived from that of Anaximander, while Demokritos is influenced by Anaxagoras. See Diels, 35 *Philol.-Vers.* 97, 7.

doctrine that the objects of sense-perception exist "by law" and not by nature.[1] This must come from Theophrastos; for, as we have seen, all later writers quote Demokritos only. A further proof of the correctness of the statement is that we also find it attributed to Diogenes of Apollonia, who, as Theophrastos tells us, derived some of his views from Leukippos. There is nothing surprising in this. Parmenides had already declared the senses to be deceitful, and said that colour and the like were only "names,"[2] and Empedokles had also spoken of coming into being and passing away as only "names."[3] It is not likely that Leukippos went much further than this. It would probably be wrong to credit him with Demokritos's clear distinction between genuine and "bastard" knowledge, or that between what are now called the primary and secondary qualities of matter.[4] These distinctions imply a conscious epistemological theory, and all we are entitled to say is that the germs of this were already to be found in the writings of Leukippos and his predecessors. Of course, these do not make Leukippos a sceptic any more than Empedokles or Anaxagoras, whose remark on this subject (fr. 21*a*) Demokritos is said to have quoted with approval.[5]

There appear to be sufficient grounds for ascribing

[1] Aet. iv. 9, 8, *οἱ μὲν ἄλλοι φύσει τὰ αἰσθητα, Λεύκιππος δὲ Δημόκριτος καὶ Ἀπολλώνιος νόμῳ*. See Zeller, *Arch.* v. p. 444.

[2] Chap. IV. p. 200, n. 3. The remarkable parallel quoted by Gomperz (p. 321) from Galilei, to the effect that tastes, smells, and colours *non sieno altro che puri nomi* should, therefore, have been cited to illustrate Parmenides rather than Demokritos.

[3] See p. 240, fr. 8.

[4] For these see Sext. *Math.* vii. 135 (R. P. 204).

[5] Sext. vii. 140, "*ὄψις γὰρ ἀδήλων τὰ φαινόμενα*," *ὥς φησιν Ἀναξαγόρας, ὃν ἐπὶ τούτῳ Δημόκριτος ἐπαινεῖ.*

the theory of perception by means of *simulacra* or εἴδωλα, which played such a part in the systems of Demokritos and Epicurus, to Leukippos.[1] It is a very natural development of the Empedoklean theory of "effluences" (§ 118). It hardly seems likely, however, that he went into great detail on the subject, and it is safer to credit Demokritos with the elaboration of the theory.

Importance of Leukippos.

183. We have seen incidentally that there is a wide divergence of opinion among recent writers as to the place of Atomism in Greek thought. The question at issue is really whether Leukippos reached his theory on what are called "metaphysical grounds," that is, from a consideration of the Eleatic theory of reality, or whether, on the contrary, it was a pure development of Ionian science. The foregoing exposition will suggest the true answer. So far as his general theory of the physical constitution of the world is concerned, it has been shown, I think, that it was derived entirely from Eleatic and Pythagorean sources, while the detailed cosmology was in the main a more or less successful attempt to make the older Ionian beliefs fit into this new physical theory. In any case, his greatness consisted in his having been the first to see how body must be regarded if we take it to be ultimate reality. The old Milesian theory had found its most adequate expression in the system of Anaximenes (§ 31), but of course rarefaction and condensation cannot be clearly represented except on the hypothesis of molecules or atoms coming closer together or going further apart in

[1] See Zeller, "Zu Leukippus" (*Arch.* xv. p. 138). The doctrine is attributed to him in Aet. iv. 13, 1 (*Dox.* p. 403); and Alexander, *de Sensu*, pp. 24, 14 and 56, 10, also mentions his name in connexion with it. This must come from Theophrastos.

space. Parmenides had seen that very clearly (fr. 2), and it was the Eleatic criticism which forced Leukippos to formulate his system as he did. Even Anaxagoras took account of Zeno's arguments about divisibility (§ 128), but his system of qualitatively different "seeds" was lacking in that simplicity which has always been the chief attraction of atomism.

CHAPTER X

ECLECTICISM AND REACTION

184. WITH Leukippos our story should properly come to an end; for he had really answered the question first asked by Thales. We have seen, however, that, though his theory of matter was of a most original and daring kind, he was not equally successful in his attempt to construct a cosmology, and this seems to have stood in the way of the recognition of the atomic theory for what it really was. We have noted the growing influence of medicine, and the consequent substitution of an interest in detailed investigation for the larger cosmological views of an earlier time, and there are several treatises in the Hippokratean *corpus* which give us a clear idea of the interest which now prevailed.[1] Leukippos had shown that "the doctrine of Melissos,"[2] which seemed to make all science impossible, was not the only conclusion that could be drawn from the Eleatic premisses, and he had gone on to give a cosmology which was substantially of the old Ionic type. The result at first was simply that all the old schools revived and had a short period of renewed activity, while at the same time some new

The "bankruptcy of science."

[1] Cf. what is said in Chap. IV. p. 167, n. 2, of the Περὶ διαίτης. The Περὶ ἀνθρώπου φύσιος and the Περὶ ἀρχαίης ἰατρικῆς are invaluable documents for the attitude of scientific men to cosmological theories at this date.

[2] Cf. Chap. VIII. p. 379, n. 2.

schools arose which sought to accommodate the older views to those of Leukippos, or to make them more available for scientific purposes by combining them in an eclectic fashion. None of these attempts had any lasting importance or influence, and what we have to consider in this chapter is really one of the periodical "bankruptcies of science" which mark the close of one chapter in its history and announce the beginning of a new one.

I. Hippon of Samos

185. Hippon of Samos or Kroton belonged to the Italian school of medicine.[1] We know very little indeed of him except that he was a contemporary of Perikles. From a scholiast on Aristophanes[2] we learn that Kratinos satirised him in his *Panoptai*; and Aristotle mentions him in the enumeration of early philosophers given in the First Book of the *Metaphysics*,[3] though only to say that the inferiority of his intellect deprives him of all claim to be reckoned among them.

Moisture. With regard to his views, the most precise statement is that of Alexander, who doubtless follows Theophrastos. It is to the effect that he held the primary substance to be Moisture, without deciding whether it was Water or Air.[4] We have the authority of Aristotle[5] and Theophrastos, represented by Hippolytos,[6] for

[1] Aristoxenos said he was a Samian (R. P. 219 a). In Menon's *Iatrika* he is called a Krotoniate, while others assign him to Rhegion or Metapontion. This probably means that he was affiliated to the Pythagorean medical school. The evidence of Aristoxenos is, in that case, all the more valuable. Hippon is mentioned along with Melissos in Iamblichos's Catalogue of Pythagoreans (*V. Pyth.* 267).

[2] Schol. on *Clouds*, 94 sqq.

[3] Arist. *Met.* A, 3. 984 a 3 (R. P. 219 a).

[4] Alexander in *Met.* p. 26, 21 (R. P. 219).

[5] Arist. *de An.* A, 2. 405 b 2 (R. P. 220).

[6] Hipp. *Ref.* i. 16 (R. P. 221).

saying that this theory was supported by physiological arguments of the kind common at the time. His other views belong to the history of Medicine.

Till quite recently no fragment of Hippon was known to exist, but a single one has now been recovered from the Geneva Scholia on Homer.[1] It is directed against the old assumption that the "waters under the earth" are an independent source of moisture, and runs thus:

> The waters we drink are all from the sea; for if wells were deeper than the sea, then it would not, doubtless, be from the sea that we drink, for then the water would not be from the sea, but from some other source. But as it is, the sea is deeper than the waters, so all the waters that are above the sea come from it. R. P. 219 b.

We observe here the universal assumption that water tends to rise from the earth, not to sink into it.

Along with Hippon, Idaios of Himera[2] may just be mentioned. We really know nothing of him except that he held air to be the primary substance. The fact that he was of Sicilian origin is, however, suggestive.

II. Diogenes of Apollonia

186. After discussing the three great representatives of the Milesian school, Theophrastos went on to say: Date.

> And Diogenes of Apollonia, too, who was almost the latest of those who gave themselves up to these studies, wrote most of his work in an eclectic fashion, agreeing in some points with Anaxagoras and in others with Leukippos. He, too, says that the primary substance of the universe is Air infinite and eternal,

[1] *Schol. Genav.* p. 197, 19. Cf. Diels in *Arch.* iv. p. 653. The extract comes from the Ὁμηρικά of Krates of Mallos.

[2] Sext. *adv. Math.* ix. 360.

from which by condensation, rarefaction, and change of state, the form of everything else arises. R. P. 206 a.[1]

This passage shows that the Apolloniate was somewhat later in date than the statement in Laertios Diogenes[2] that he was contemporary with Anaxagoras would lead us to suppose, and the fact that he is satirised in the *Clouds* of Aristophanes points in the same direction.[3] Of his life we know next to nothing. He was the son of Apollothemis, and came from Apollonia in Crete.[4] The Ionic dialect in which he wrote is no objection to this; it was the regular dialect for cosmological works.[5]

The fact that Diogenes was parodied in the *Clouds* suggests that he had found his way to Athens; and we have the excellent authority of Demetrios Phalereus[6] for saying that the Athenians treated him in the usual way. He excited so great dislike as nearly to imperil his life.

Writings. 187. Simplicius affirms that Diogenes wrote several works, though he allows that only one survived till his own day, namely, the Περὶ φύσεως.[7] This statement is

[1] On this passage see Diels, "Leukippos und Diogenes von Apollonia" (*Rhein. Mus.* xlii. pp. 1 sqq.). Natorp's view that the words are merely those of Simplicius (*ib.* xli. pp. 349 sqq.) can hardly be maintained.

[2] Diog. ix. 57 (R. P. 206). The statement of Antisthenes, the writer of *Successions*, that he had "heard" Anaximenes is due to the usual confusion. He was doubtless, like Anaxagoras, "an associate of the philosophy of Anaximenes." Cf. Chap. VI. § 122.

[3] Aristoph. *Clouds*, 227 sqq., where Sokrates speaks of "mixing his subtle thought with the kindred air," and especially the words ἡ γῆ βίᾳ | ἕλκει πρὸς αὑτὴν τὴν ἰκμάδα τῆς φροντίδος. For the ἰκμάς, see Beare, p. 259. Cf. also Eur. *Tro.* 884, ὦ γῆς ὄχημα κἀπὶ γῆς ἕδραν ἔχων κ.τ.λ.

[4] Diog. ix. 57 (R. P. 206). [5] Cf. Chap. VII. pp. 327 sqq.

[6] Diog. ix. 57, τοῦτόν φησιν ὁ Φαληρεὺς Δημήτριος ἐν τῇ Σωκράτους ἀπολογίᾳ διὰ μέγαν φθόνον μικροῦ κινδυνεῦσαι Ἀθήνησιν. Diels follows Volkmann in holding that this is a note on Anaxagoras which has been inserted in the wrong place. I do not think this is necessary, though it is certainly possible.

[7] Simpl. *Phys.* p. 151, 24 (R. P. 207 a).

based upon references in the surviving work itself, and is not to be lightly rejected. In particular, it is very credible that he wrote a tract *Against the Sophists*, that is to say, the pluralist cosmologists of the day.[1] That he wrote a *Meteorology* and a book called *The Nature of Man* is also quite probable. This would be a physiological or medical treatise, and perhaps the famous fragment about the veins comes from it.[2]

188. The work of Diogenes seems to have been preserved in the Academy; practically all the fairly extensive fragments which we still have are derived from Simplicius. I give them as they are arranged by Diels:— The Fragments.

(1) In beginning any discourse, it seems to me that one should make one's starting-point something indisputable, and one's expression simple and dignified. R. P. 207.

(2) My view is, to sum it all up, that all things are differentiations of the same thing, and are the same thing. And this is obvious; for, if the things which are now in this world—earth, and water, and air and fire, and the other things which we see existing in this world,—if any one of these things, I say, were different from any other, different, that is, by having a substance peculiar to itself; and if it were not the same thing that is often changed and differentiated, then things could not in any way mix with one another, nor could they do one another good or harm. Neither could a plant grow out of the earth, nor any animal nor anything else come into being unless things were composed in such a way as to be the same. But all these things arise from the same thing; they are differentiated and take different forms at different times, and return again to the same thing. R. P. 208.

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[1] Simplicius says *Πρὸς φυσιολόγους*, but he adds that Diogenes called them *σοφισταί*, which is the older word. This is, so far, in favour of the genuineness of the work.

[2] Diels gives this as fr. 6 (*Vors*. p. 350). I have omitted it, as it really belongs to the history of Medicine.

(3) For it would not be possible for it to be divided as it is without intelligence, so as to keep the measures of all things, of winter and summer, of day and night, of rains and winds and fair weather. And any one who cares to reflect will find that everything else is disposed in the best possible manner. R. P. 210.

(4) And, further, there are still the following great proofs. Men and all other animals live upon air by breathing it, and this is their soul and their intelligence, as will be clearly shown in this work; while, when this is taken away, they die, and their intelligence fails. R. P. 210.

(5) And my view is, that that which has intelligence is what men call air, and that all things have their course steered by it, and that it has power over all things. For this very thing I hold to be a god,[1] and to reach everywhere, and to dispose everything, and to be in everything; and there is not anything which does not partake in it. Yet no single thing partakes in it just in the same way as another; but there are many modes both of air and of intelligence. For it undergoes many transformations, warmer and colder, drier and moister, more stable and in swifter motion, and it has many other differentiations in it, and an infinite number of colours and savours. And the soul of all living things is the same, namely, air warmer than that outside us and in which we are, but much colder than that near the sun. And this warmth is not alike in any two kinds of living creatures, nor, for the matter of that, in any two men; but it does not differ much, only so far as is compatible with their being alike. At the same time, it is not possible for any of the things which are differentiated to be exactly like one another till they all once more become the same.

(6) Since, then, differentiation is multiform, living creatures are multiform and many, and they are like one another neither

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[1] The MSS. of Simplicius have *ἔθος*, not *θεός*; but I adopt Usener's certain correction. It is confirmed by the statement of Theophrastos, that the air within us is "a small portion of the god" (*de Sens.* 42); and by Philodemos (*Dox.* p. 536), where we read that Diogenes praises Homer, *τὸν ἀέρα γὰρ αὐτὸν Δία νομίζειν φησίν, ἐπειδὴ πᾶν εἰδέναι τὸν Δία λέγει* (cf. Cic. *Nat. D.* i. 12, 29).

in appearance nor in intelligence, because of the multitude of differentiations. At the same time, they all live, and see, and hear by the same thing, and they all have their intelligence from the same source. R. P. 211.

(7) And this itself is an eternal and undying body, but of those things[1] some come into being and some pass away.

(8) But this, too, appears to me to be obvious, that it is both great, and mighty, and eternal, and undying, and of great knowledge. R. P. 209.

That the chief interest of Diogenes was a physiological one, is clear from his elaborate account of the veins, preserved by Aristotle.[2] It is noticeable, too, that one of his arguments for the underlying unity of all substances is that without this it would be impossible to understand how one thing could do good or harm to another (fr. 2). In fact, the writing of Diogenes is essentially of the same character as a good deal of the pseudo-Hippokratean literature, and there is much to be said for the view that the writers of these curious tracts made use of him very much as they did of Anaxagoras and Herakleitos.[3]

189. Like Anaximenes, Diogenes regarded Air as the primary substance; but we see from his arguments that he lived at a time when other views had become prevalent. He speaks clearly of the four Empedoklean elements (fr. 2), and he is careful to attribute to Air Cosmology.

[1] The MSS. of Simplicius have τῷ δέ, but surely the Aldine τῶν δέ is right.

[2] Arist. *Hist. An.* Γ, 2. 511 b 30.

[3] See Weygoldt, "Zu Diogenes von Apollonia" (*Arch.* i. pp. 161 sqq.). Hippokrates himself represented just the opposite tendency to that of those writers. His great achievement was the separation of medicine from philosophy, a separation most beneficial to both (Celsus, i. pr.). This is why the Hippokratean corpus contains some works in which the "sophists" are denounced and others in which their writings are pillaged. To the latter class belong the Περὶ διαίτης and the Περὶ φυσῶν; to the former, especially the Περὶ ἀρχαίης ἰατρικῆς.

the attributes of Nous as taught by Anaxagoras (fr. 4). The doxographical tradition as to his cosmological views is fairly preserved :—

Diogenes of Apollonia makes air the element, and holds that all things are in motion, and that there are innumerable worlds. And he describes the origin of the world thus. When the All moves and becomes rare in one place and dense in another, where the dense met together it formed a mass, and then the other things arose in the same way, the lightest parts occupying the highest position and producing the sun. [Plut.] *Strom.* fr. 12 (R. P. 215).

Nothing arises from what is not nor passes away into what is not. The earth is round, poised in the middle, having received its shape through the revolution proceeding from the warm and its solidification from the cold. Diog. ix. 57 (R. P. 215).

The heavenly bodies were like pumice-stone. He thinks they are the breathing-holes of the world, and that they are red-hot. Aet. ii. 13, 5 = Stob. i. 508 (R. P. 215).

The sun was like pumice-stone, and into it the rays from the aether fix themselves. Aet. ii. 20, 10. The moon was a pumice-like conflagration. *Ib.* ii. 25, 10.

Along with the visible heavenly bodies revolve invisible stones, which for that very reason are nameless; but they often fall and are extinguished on the earth like the stone star which fell down flaming at Aigospotamos.[1] *Ib.* ii. 13, 9.

We have here nothing more than the old Ionian doctrine with a few additions from more recent sources. Rarefaction and condensation still hold their place in the explanation of the opposites, warm and cold, dry and moist, stable and mobile (fr. 5). The differentiations into opposites which Air may undergo are, as Anaxagoras had taught, infinite in number; but all may be reduced to the primary opposition of rare and

[1] See Chap. VI. p. 292, n. 1.

dense. We may gather, too, from Censorinus[1] that Diogenes did not, like Anaximenes, speak of earth and water as arising from Air by condensation, but rather of blood, flesh, and bones. In this he followed Anaxagoras (§ 130), as it was natural that he should. That portion of Air, on the other hand, which was rarefied became fiery, and produced the sun and heavenly bodies. The circular motion of the world is due to the intelligence of the Air, as is also the division of all things into different forms of body and the observance of the "measures" by these forms.[2]

Like Anaximander (§ 20), Diogenes regarded the sea as the remainder of the original moist state, which had been partially evaporated by the sun, so as to separate out the remaining earth.[3] The earth itself is round, that is to say, it is a disc: for the language of the doxographers does not point to the spherical form.[4] Its solidification by the cold is due to the fact that cold is a form of condensation.

Diogenes did not hold with the earlier cosmologists that the heavenly bodies were made of air or fire, nor yet with Anaxagoras, that they were stones. They were, he said, pumice-like, a view in which we may trace the influence of Leukippos. They were earthy, indeed, but not solid, and the celestial fire permeated their pores. And this explains why we do not see the dark bodies which, in common with Anaxagoras, he held to revolve along with the stars. They really are solid stones, and therefore cannot be penetrated by the fire. It was one of these that fell into the

[1] Censorinus, *de die natali*, 6, 1 (*Dox.* p. 190).

[2] On the "measures" see Chap. III. § 72.

[3] Theophr. *ap.* Alex. in *Meteor.* p. 67, 1 (*Dox.* p. 494).

[4] Diog. ix. 57 (R. P. 215).

Aigospotamos. Like Anaxagoras, Diogenes affirmed that the inclination of the earth happened subsequently to the rise of animals.[1]

We are prepared to find that Diogenes held the doctrine of innumerable worlds; for it was the old Milesian belief, and had just been revived by Anaxagoras and Leukippos. He is mentioned with the rest in the *Placita*; and if Simplicius classes him and Anaximenes with Herakleitos as holding the Stoic doctrine of successive formations and destructions of a single world, he has probably been misled by the "accommodators."[2]

[A]nimals and [p]lants.

190. Living creatures arose from the earth, doubtless under the influence of heat. Their souls, of course, were air, and their differences were due to the various degrees in which it was rarefied or condensed (fr. 5). No special seat, such as the heart or the brain, was assigned to the soul; it was simply the warm air circulating with the blood in the veins.

The views of Diogenes as to generation, respiration, and the blood, belong to the history of Medicine;[3] his theory of sensation too, as it is described by Theophrastos,[4] need only be mentioned in passing. Briefly stated, it amounts to this, that all sensation is due to the action of air upon the brain and other organs, while pleasure is aeration of the blood. But the details of the theory can only be studied properly in connexion with the Hippokratean writings; for Diogenes does not

[1] Aet. ii. 8, 1 (R. P. 215).

[2] Simpl. *Phys.* p. 1121, 12. See Chap. I. p. 83, n. 1.

[3] See Censorinus, quoted in *Dox.* p. 191.

[4] Theophr. *de Sens.* 39 sqq. (R. P. 213, 214). For a full account, see Beare, pp. 41 sqq., 105, 140, 169, 209, 258. As Prof. Beare remarks, Diogenes "is one of the most interesting of the pre-Platonic psychologists" (p. 258).

really represent the old cosmological tradition, but a fresh development of reactionary philosophical views combined with an entirely new enthusiasm for detailed investigation and accumulation of facts.

III. Archelaos of Athens

191. The last of the early cosmologists was Archelaos of Athens, who was a disciple of Anaxagoras.[1] He is also said to have been the teacher of Sokrates, a statement by no means so improbable as is sometimes supposed.[2] There is no reason to doubt the tradition that Archelaos succeeded Anaxagoras in the school at Lampsakos.[3] We certainly hear of Anaxagoreans,[4] though their fame was soon obscured by the rise of the Sophists, as we call them. Anaxagorea

192. On the cosmology of Archelaos, Hippolytos[5] writes as follows:— Cosmology.

Archelaos was by birth an Athenian, and the son of Apollodoros. He spoke of the mixture of matter in a similar way to Anaxagoras, and of the first principles likewise. He held, however, that there was a certain mixture immanent even in Nous. And he held that there were two efficient causes which were separated off from one another, namely, the warm and the cold. The former was in motion, the latter at rest. When the water was liquefied it flowed to the centre, and there being burnt up it turned to earth and air, the latter of which was borne upwards, while the former took up its position below. These, then, are the reasons why the earth is at rest, and why it came into being. It lies in the

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[1] Diog. ii. 16 (R. P. 216).

[2] See Chiapelli in *Arch.* iv. pp. 369 sqq.

[3] Euseb. *P. E.* p. 504, c 3, ὁ δὲ Ἀρχέλαος ἐν Λαμψάκῳ διεδέξατο τὴν σχολὴν τοῦ Ἀναξαγόρου.

[4] Ἀναξαγόρειοι are mentioned by Plato (*Crat.* 409 b 6), and often by the Aristotelian commentators.

[5] Hipp. *Ref.* i. 9 (R. P. 218).

centre, being practically no appreciable part of the universe. (But the air rules over all things),[1] being produced by the burning of the fire, and from its original combustion comes the substance of the heavenly bodies. Of these the sun is the largest, and the moon second; the rest are of various sizes. He says that the heavens were inclined, and that then the sun made light upon the earth, made the air transparent, and the earth dry; for it was originally a pond, being high at the circumference and hollow in the centre. He adduces as a proof of this hollowness that the sun does not rise and set at the same time for all peoples, as it ought to do if the earth were level. As to animals, he says that when the earth was first being warmed in the lower part where the warm and the cold were mingled together, many living creatures appeared, and especially men, all having the same manner of life, and deriving their sustenance from the slime; they did not live long, and later on generation from one another began. And men were distinguished from the rest, and set up leaders, and laws, and arts, and cities, and so forth. And he says that Nous is implanted in all animals alike; for each of the animals, as well as man, makes use of Nous, but some quicker and some slower.

It is not necessary to say much with regard to this theory, which in many respects contrasts unfavourably with its predecessors. It is clear that, just as Diogenes had tried to introduce certain Anaxagorean ideas into the philosophy of Anaximenes, so Archelaos sought to bring Anaxagoreanism nearer to the old Ionic views by supplementing it with the opposition of warm and cold, rare and dense, and by stripping Nous of that simplicity which had marked it off from the other "things" in his master's system. It was probably for this reason, too, that Nous was no longer regarded as the maker of the world.[2] Leukippos had made such a

[1] Inserting τὸν δ' ἀέρα κρατεῖν τοῦ παντός, as suggested by Roeper.

[2] Aet. i. 7, 4=Stob. i. 56 (R. P. 217 a).

force unnecessary. It may be added that this twofold relation of Archelaos to his predecessors makes it very credible that, as Aetios tells us,[1] he believed in innumerable worlds; both Anaxagoras and the older Ionians upheld that doctrine.

193. The cosmology of Archelaos, like that of Diogenes, has all the characteristics of the age to which it belonged—an age of reaction, eclecticism, and investigation of detail.[2] Hippon of Samos and Idaios of Himera represent nothing more than the feeling that philosophy had run into a blind alley, from which it could only escape by trying back. The Herakleiteans at Ephesos, impenetrably wrapped up as they were in their own system, did little but exaggerate its paradoxes and develop its more fanciful side.[3] It was not enough for Kratylos to say with Herakleitos (fr. 84) that you cannot step twice into the same river; you could not do so even once.[4] But in nothing was the total bankruptcy of the early cosmology so clearly shown as in the work of Gorgias, entitled *Substance or the Non-existent*, in which an absolute nihilism was set forth and based upon the Eleatic dialectic.[5] The fact is that philosophy, so long as it clung to its old presuppositions, had nothing more to say; for the answer of Leukippos to the question of Conclusion.

[1] Aet. ii. 1, 3.

[2] Windelband, § 25. The period is well described by Fredrich, *Hippokratische Untersuchungen*, pp. 130 sqq. It can only be treated fully in connexion with the Sophists.

[3] For an amusing picture of the Herakleiteans see Plato, *Tht.* 179 e. The new interest in language, which the study of rhetoric had called into life, took with them the form of fantastic and arbitrary etymologising, such as is satirised in Plato's *Cratylus*.

[4] Arist. *Met.* Γ, 5. 1010 a 12. He refused even to speak, we are told, and only moved his finger.

[5] Sext. *adv. Math.* vii. 65 (R. P. 235); *M.X.G.* 979 a 13 (R. P. 236).

Thales was really final. Fresh life must be given to the speculative impulse by the raising of new problems, those of knowledge and conduct, before any further progress was possible; and this was done by the "Sophists" and Sokrates. Then, in the hands of Demokritos and Plato, philosophy took a new form, and started on a fresh course.

APPENDIX

THE SOURCES

A.—PHILOSOPHERS

1. It is not very often that Plato allows himself to dwell upon the history of philosophy as it was before the rise of ethical and epistemological inquiry; but when he does, his guidance is simply invaluable. His artistic gift and his power of entering into the thoughts of other men enabled him to describe the views of early philosophers in a thoroughly objective manner, and he never, except in a playful and ironical way, sought to read unthought-of meanings into the words of his predecessors. Of special value for our purpose are his contrast between Empedokles and Herakleitos (*Soph.* 242 d), and his account of the relation between Zeno and Parmenides (*Parm.* 128 a). Plato.

See Zeller, "Plato's Mittheilungen über frühere und gleichzeitige Philosophen" (*Arch.* v. pp. 165 sqq.); and Index, *s.v.* Plato.

2. As a rule, Aristotle's statements about early philosophers are less historical than Plato's. Not that he failed to understand the facts, but he nearly always discusses them from the point of view of his own system. He is convinced that his own philosophy accomplishes what all previous philosophers had aimed at, and their systems are therefore regarded as "lisping" attempts to formulate it (*Met.* A, 10. 993 a 15). It is also to be noted that Aristotle regards some systems in a Aristotle

much more sympathetic way than others. He is distinctly unfair to the Eleatics, for instance.

It is often forgotten that Aristotle derived much of his information from Plato, and we must specially observe that he more than once takes Plato's irony too literally.

See Emminger, *Die Vorsokratischen Philosophen nach den Berichten des Aristoteles*, 1878. Index, *s.v.* Aristotle.

Stoics.

3. The Stoics, and especially Chrysippos, paid great attention to early philosophy, but their way of regarding it was simply an exaggeration of Aristotle's. They did not content themselves with criticising their predecessors from their own point of view; they seem really to have believed that the early poets and thinkers held views hardly distinguishable from theirs. The word *συνοικειοῦν*, which Cicero renders by *accommodare*, was used by Philodemos to denote this method of interpretation,[1] which has had serious results upon our tradition, especially in the case of Herakleitos (p. 157).

Skeptics.

4. The same remarks apply *mutatis mutandis* to the Skeptics. The interest of such a writer as Sextus Empiricus in early philosophy is to show that skepticism went back to an early date—as far as Xenophanes, in fact. But what he tells us is often of value; for he frequently quotes early views as to knowledge and sensation in support of his thesis.

Neoplatonists.

5. Under this head we have chiefly to consider the commentators on Aristotle in so far as they are independent of the Theophrastean tradition. Their chief characteristic is what Simplicius calls *εὐγνωμοσύνη*, that is, a liberal spirit of interpretation, which makes all early philosophers agree with one another in upholding the doctrine of a Sensible and an

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[1] Cf. Cic. *De nat. D.* i. 15, 41: "Et haec quidem (Chrysippus) in primo libro de natura deorum, in secundo autem vult Orphei, Musaei, Hesiodi Homerique fabellas accommodare ad ea quae ipse primo libro de deis immortalibus dixerat, ut etiam veterrimi poetae, qui haec ne suspicati quidem sunt, Stoici fuisse videantur." Cf. Philod. *de piet. fr.* c. 13, *ἐν δὲ τῷ δευτέρῳ τά τε εἰς Ὀρφέα καὶ Μουσαῖον ἀναφερόμενα καὶ τὰ παρ' Ὁμήρῳ καὶ Ἡσιόδῳ καὶ Εὐριπίδῃ καὶ ποιηταῖς ἄλλοις, ὡς καὶ Κλεάνθης, πειρᾶται συνοικειοῦν ταῖς δόξαις αὐτῶν.*

Intelligible World. It is, however, to Simplicius more than any one else that we owe the preservation of the fragments. He had, of course, the library of the Academy at his disposal.

B.—DOXOGRAPHERS

6. The *Doxographi graeci* of Professor Hermann Diels (1879) threw an entirely new light upon the filiation of the later sources; and we can only estimate justly the value of statements derived from these if we bear constantly in mind the results of his investigation. Here it will only be possible to give an outline which may help the reader to find his way in the *Doxographi graeci* itself. The *Doxographi graeci*

7. By the term *doxographers* we understand all those writers who relate the opinions of the Greek philosophers, and who derive their material, directly or indirectly, from the great work of Theophrastos, Φυσικῶν δοξῶν ιη´ (Diog. v. 46). Of this work, one considerable chapter, that entitled Περὶ αἰσθήσεων, has been preserved (*Dox.* pp. 499-527). And Usener, following Brandis, further showed that there were important fragments of it contained in the commentary of Simplicius (sixth cent. A.D.) on the First Book of Aristotle's Φυσικὴ ἀκρόασις (Usener, *Analecta Theophrastea*, pp. 25 sqq.). These extracts Simplicius seems to have borrowed in turn from Alexander of Aphrodisias (*c.* 200 A.D.); cf. *Dox.* p. 112 sqq. We thus possess a very considerable portion of the First Book, which dealt with the ἀρχαί, as well as practically the whole of the last Book. The "Opinions" Theophrastos

From these remains it clearly appears that the method of Theophrastos was to discuss in separate books the leading topics which had engaged the attention of philosophers from Thales to Plato. The chronological order was not observed; the philosophers were grouped according to the affinity of their doctrine, the differences between those who appeared to agree most closely being carefully noted. The First Book, however, was in some degree exceptional; for in it the order was that of the successive schools, and short historical and chronological notices were inserted.

Doxographers. 8. A work of this kind was, of course, a godsend to the epitomators and compilers of handbooks, who flourished more and more as the Greek genius declined. These either followed Theophrastos in arranging the subject-matter under heads, or else they broke up his work, and rearranged his statements under the names of the various philosophers to whom they applied. This latter class form the natural transition between the doxographers proper and the biographers, so I have ventured to distinguish them by the name of *biographical doxographers*.

I. Doxographers Proper

The *Placita* and Stobaios. 9. These are now represented by two works, viz. the *Placita Philosophorum*, included among the writings ascribed to Plutarch, and the *Eclogae Physicae* of John Stobaios (*c.* 470 A.D.). The latter originally formed one work with the *Florilegium* of the same author, and includes a transcript of some epitome substantially identical with the pseudo-Plutarchean *Placita*. It is, however, demonstrable that neither the *Placita* nor the doxography of the *Eclogae* is the original of the other. The latter is usually the fuller of the two, and yet the former must be earlier; for it was used by Athenagoras for his defence of the Christians in 177 A.D. (*Dox.* p. 4). It was also the source of the notices in Eusebios and Cyril, and of the *History of Philosophy* ascribed to Galen. From these writers many important corrections of the text have been derived (*Dox.* pp. 5 sqq.).

Another writer who made use of the *Placita* is Achilles (*not* Achilles Tatius). Extracts from his Εἰσαγωγή to the *Phaenomena* of Aratos are included in the *Uranologion* of Petavius, pp. 121-164. His date is uncertain, but probably he belongs to the third century A.D. (*Dox.* p. 18).

Aetios. 10. What, then, was the common source of the *Placita* and the *Eclogae*? Diels has shown that Theodoret (*c.* 445 A.D.) had access to it; for in some cases he gives a fuller form of statements made in these two works. Not only so, but he also names that source; for he refers us (*Gr. aff. cur.* iv. 31)

to Ἀετίου τὴν περὶ ἀρεσκόντων συναγωγήν. Diels has accordingly printed the *Placita* in parallel columns with the relevant parts of the *Eclogae*, under the title of *Aetii Placita*. The quotations from "Plutarch" by later writers, and the extracts of Theodoret from Aetios, are also given at the foot of each page.

11. Diels has shown further, however, that Aetios did not draw directly from Theophrastos, but from an intermediate epitome which he calls the *Vetusta Placita*, traces of which may be found in Cicero (*infra*, § 12), and in Censorinus (*De die natali*), who follows Varro. The *Vetusta Placita* were composed in the school of Poseidonios, and Diels now calls them the Poseidonian Ἀρέσκοντα (*Über das phys. System des Straton*, p. 2). There are also traces of them in the "Homeric Allegorists." The *Vetusta Placita.*

It is quite possible, by discounting the somewhat unintelligent additions which Aetios made from Epicurean and other sources, to form a pretty accurate table of the contents of the *Vetusta Placita* (*Dox.* pp. 181 sqq.), and this gives us a fair idea of the arrangement of the original work by Theophrastos.

12. So far as what he tells us of the earliest Greek philosophy goes, Cicero must be classed with the doxographers, and not with the philosophers; for he gives us nothing but extracts at second or third hand from the work of Theophrastos. Two passages in his writings fall to be considered under this head, namely, "Lucullus" (*Acad.* ii.), 118, and *De natura Deorum*, i. 25-41. Cicero.

(*a*) *Doxography of the "Lucullus."*—This contains a meagre and inaccurately-rendered summary of the various opinions held by philosophers with regard to the ἀρχή (*Dox.* pp. 119 sqq.), and would be quite useless if it did not in one case enable us to verify the exact words of Theophrastos (Chap. I. p. 52, *n.* 2). The doxography has come through the hands of Kleitomachos, who succeeded Karneades in the headship of the Academy (129 B.C.).

(*b*) *Doxography of the "De natura Deorum."*—A fresh light was thrown upon this important passage by the discovery at

Herculaneum of a roll containing fragments of an Epicurean treatise, so like it as to be at once regarded as its original. This treatise was at first ascribed to Phaidros, on the ground of the reference in *Epp. ad Att.* xiii. 39. 2; but the real title, Φιλοδήμου περὶ εὐσεβείας, was afterwards restored (*Dox.* p. 530). Diels, however, has shown (*Dox.* pp. 122 sqq.) that there is much to be said for the view that Cicero did not copy Philodemos, but that both drew from a common source (no doubt Phaidros, Περὶ θεῶν) which itself went back to a Stoic epitome of Theophrastos. The passage of Cicero and the relevant fragments of Philodemos are edited in parallel columns by Diels (*Dox.* pp. 531 sqq.).

II. Biographical Doxographers

Hippolytos.

13. Of the "biographical doxographies," the most important is Book I. of the *Refutation of all Heresies* by Hippolytos. This had long been known as the *Philosophoumena* of Origen; but the discovery of the remaining books, which were first published at Oxford in 1854, showed finally that it could not belong to him. It is drawn mainly from some good epitome of Theophrastos, in which the matter was already rearranged under the names of the various philosophers. We must note, however, that the sections dealing with Thales, Pythagoras, Herakleitos, and Empedokles come from an inferior source, some merely biographical compendium full of apocryphal anecdotes and doubtful statements.

The *Stromateis.*

14. The fragments of the pseudo-Plutarchean *Stromateis*, quoted by Eusebios in his *Praeparatio Evangelica*, come from a source similar to that of the best portions of the *Philosophoumena*. So far as we can judge, they differ chiefly in two points. In the first place, they are mostly taken from the earliest sections of the work, and therefore most of them deal with the primary substance, the heavenly bodies and the earth. In the second place, the language is a much less faithful transcript of the original.

"Diogenes Laertios."

15. The scrap-book which goes by the name of Diogenes Laertios, or Laertios Diogenes (cf. Usener, *Epicurea*, pp. 1 sqq.),

contains large fragments of two distinct doxographies. One is of the merely biographical, anecdotic, and apophthegmatic kind used by Hippolytos in his first four chapters; the other is of a better class, more like the source of Hippolytos' remaining chapters. An attempt is made to disguise this "contamination" by referring to the first doxography as a "summary" (κεφαλαιωδής) account, while the second is called "particular" (ἐπὶ μέρους).

16. Short doxographical summaries are to be found in Eusebios (*P. E.* x., xiv., xv.), Theodoret (*Gr. aff. cur.* ii. 9-11), Irenæus (*C. haer.* ii. 14), Arnobius (*Adv. nat.* ii. 9), Augustine (*Civ. Dei*, viii. 2). These depend mainly upon the writers of "Successions," whom we shall have to consider in the next section. Patristic doxographies.

C.—BIOGRAPHERS

17. The first to write a work entitled *Successions of the Philosophers* was Sotion (Diog. ii. 12; R. P. 4 a), about 200 B.C. The arrangement of his work is explained in *Dox.* p. 147. It was epitomised by Herakleides Lembos. Other writers of Διαδοχαί were Antisthenes, Sosikrates, and Alexander. All these compositions were accompanied by a very meagre doxography, and made interesting by the addition of unauthentic apophthegms and apocryphal anecdotes. Successions.

18. The peripatetic Hermippos of Smyrna, known as Καλλιμάχειος (*c.* 200 B.C.), wrote several biographical works which are frequently quoted. The biographical details are very untrustworthy indeed; but sometimes bibliographical information is added, which doubtless rests upon the Πίνακες of Kallimachos. Hermippos.

19. Another peripatetic, Satyros, the pupil of Aristarchos, wrote (*c.* 160 B.C.) *Lives of Famous Men*. The same remarks apply to him as to Hermippos. His work was epitomised by Herakleides Lembos. Satyros.

20. The work which goes by the name of Laertios Diogenes is, in its biographical parts, a mere patchwork of all "Diogenes Laertios."

earlier learning. It has not been digested or composed by any single mind at all. It is little more than a collection of extracts made at haphazard, possibly by more than one successive possessor of the MS. But, of course, it contains much that is of the greatest value.

D.—CHRONOLOGISTS

Eratosthenes and Apollodoros.

21. The founder of ancient chronology was Eratosthenes of Kyrene (275-194 B.C.); but his work was soon supplanted by the metrical version of Apollodoros (*c.* 140 B.C.), from which most of our information as to the dates of early philosophers is derived. See Diels' paper on the Χρονικά of Apollodoros in *Rhein. Mus.* xxxi.; and Jacoby, *Apollodors Chronik* (1902).

The method adopted is as follows:—If the date of some striking event in a philosopher's life is known, that is taken as his *floruit* (ἀκμή), and he is assumed to have been forty years old at that date. In default of this, some historical era is taken as the *floruit*. Of these the chief are the eclipse of Thales 586/5 B.C., the taking of Sardeis in 546/5 B.C., the accession of Polykrates in 532/1 B.C., and the foundation of Thourioi in 444/3 B.C. Further details will easily be found by reference to the Index, *s.v.* Apollodoros.

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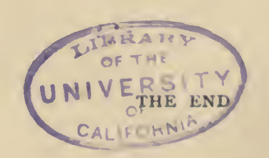
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THE END

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